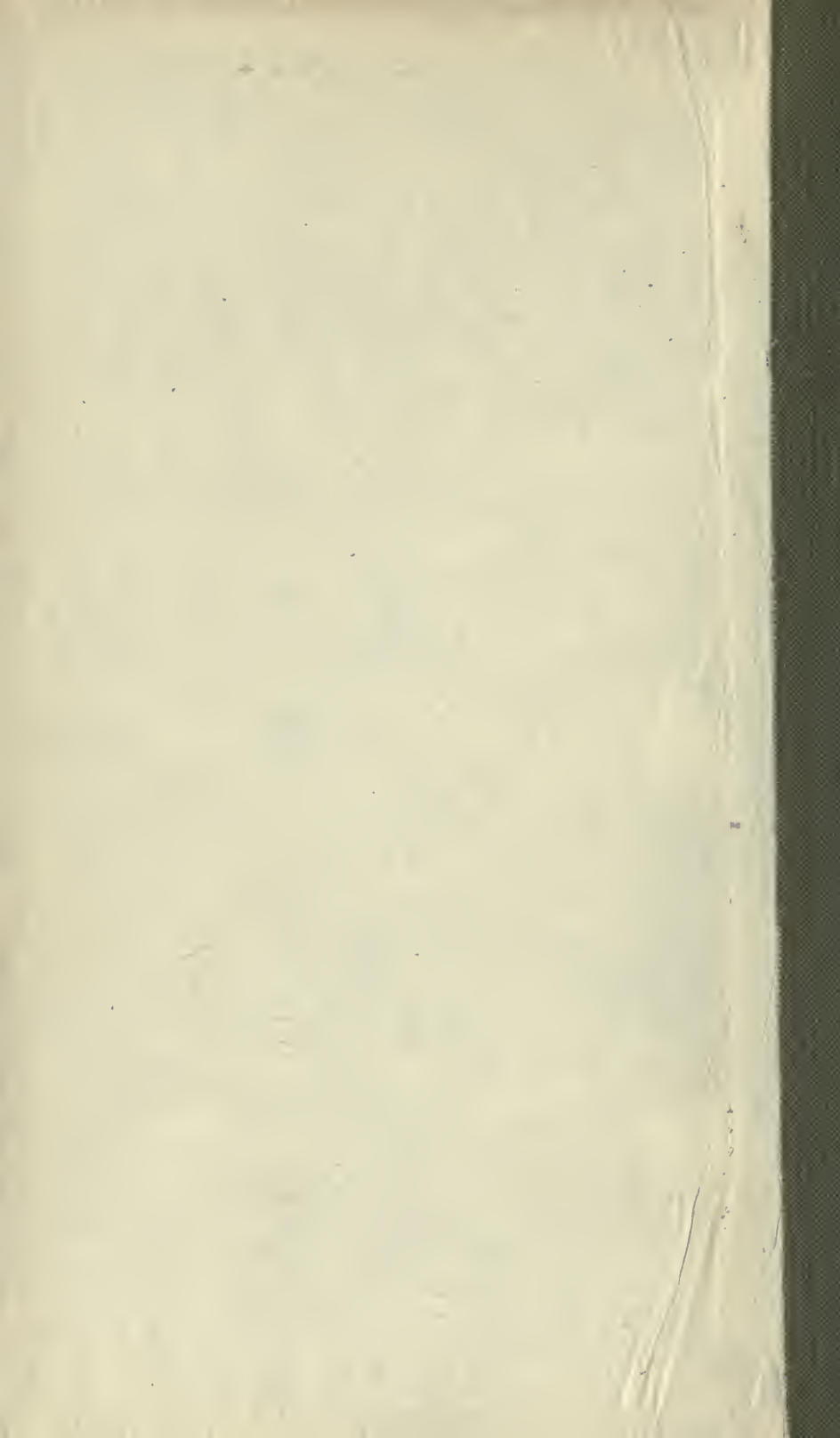




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THE SURGICAL CLINICS OF CHICAGO

AUGUST, 1920 - Dec. 1920

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WITH 80 ILLUSTRATIONS

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SURGICAL CLINICS OF CHICAGO

Volume 4

Number 4

CLINIC OF DR. D. N. EISENDRATH

COOK COUNTY HOSPITAL

THE ANATOMIC VARIETIES OF PROSTATIC HYPERTROPHY

Summary: Demonstration of specimens and clay models to illustrate the embryologic development and types of pathologic hypertrophy of the prostate. Discussion of the clinical significance of the anatomic varieties of prostatic hypertrophy.

IN order to be able to perform either the suprapubic or perineal operation for the removal of the hypertrophied prostate it is essential to be cognizant of all of the various forms of enlargement which may be found. We are very apt to think of the hypertrophied prostate as being composed of either two lateral lobes, or of these combined with a middle lobe, or of the latter predominating as the type of prostatic hypertrophy.

During the present series of clinics I have operated on a number of these cases by the suprapubic route, and you have had ample opportunity to note the fact that the removal of the hypertrophied prostate is a comparatively easy task in some cases, while in others all of the ingenuity and patience of the operator is taxed to the utmost. These differences are due usually (*a*) to the variation in the mode of development of the various lobes of the hypertrophied prostate, and (*b*) to the fact that while in some cases the entire prostate or individual lobes can be easily enucleated because of the soft consistency, in other cases the tissue of prostatic hypertrophy is of such a tough and fibrous nature that the removal requires great care not to injure the immediately adjacent rectum.

In order that you may visualize the different forms of enlargement I have had some clay models made¹ which will give you a

¹ Figures 218 to 223 inclusive were made from the specimens and clay models.

better idea of the subject than any extended description. In order to understand these various combinations it will be advisable to recall some of the principal features of the embryology of the prostate. O. S. Lowsley¹ has made a very important contribution to this subject, and I would suggest a study of his original article to those of you who have occasion to perform either perineal or suprapubic prostatectomy. I can also warmly recommend reading the section on the Anatomy of the Prostate by Quinby and that on Prostatic Obstructions by the late Paul Pilcher in Cabot's Modern Urology. It is of the greatest importance for surgeons who undertake such an operation as

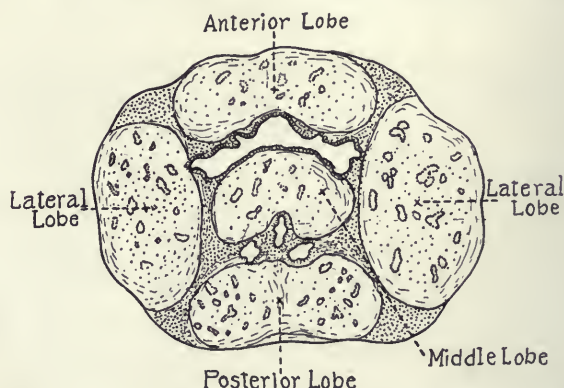


Fig. 216.—Diagrammatic representation of cross-section through middle of embryonic prostate showing location of various lobes of prostate. (After Lowsley.)

prostatectomy to have a clear conception of the anatomy of the normal prostate as well as of the various forms of pathologic changes which take place in this organ in later life.

In the posterior portion of the urethra of a three months' old embryo masses and tubules of glandular cells are found which form respectively the anterior, posterior, two lateral, and the middle lobes of the prostate (Figs. 216, 217). All of these persist after birth except the tubules of the anterior lobe, which becomes insignificant or may even disappear entirely. Occasionally, however, this anterior lobe may persist and hypertrophy.

¹ Surg., Gynec., and Obst., 20, 183, 1915.

There are two other small groups (Fig. 217) of glands in the embryo—the subcervical and subtrigonal. Lowsley believes that the former of these two groups is the portion of the gland which most frequently proliferates and that such an enlargement may cause urinary obstruction. He found this group of glands enlarged in 14.7 per cent. of 224 prostate glands (from the age of one month to that of seventy-nine years) which he examined. This view of Lowsley has received but little support up to the present.

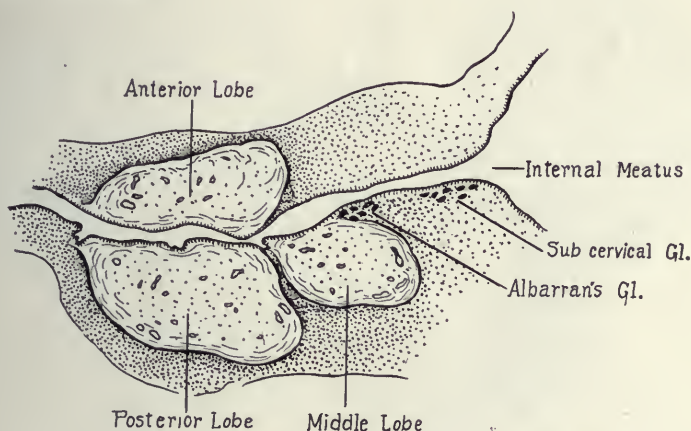


Fig. 217.—Diagrammatic representation of longitudinal section of embryonic neck of bladder, prostate, and posterior urethra in order to show the location of the anterior, posterior and middle lobes, and of the subcervical glands. (After Lowsley.)

In hypertrophy of the prostate as we find it after middle life the posterior lobe (Figs. 216, 217) is seldom involved, but it seems to be a starting-point for malignant degeneration in many cases.

I will now show you a number of prostate glands which have been removed on account of hypertrophy resulting in obstruction at the bladder neck with its familiar group of symptoms.

The first specimen (Fig. 218) shows a typical enlargement of both lateral lobes alone. You can readily understand how the urethra would be compressed from both sides. A more or less rigid tunnel-like passage is thus formed between whose canyon-

like walls the stream of urine must pass. There is no trace of hypertrophy of the middle lobe. The two lateral enlargements are held together in front and behind by a firm commissure of fibrous tissue. The posterior band is especially difficult to separate from the false, that is, fascial capsule of the prostate, during removal of the gland.

Let us study a second specimen removed at operation which shows hypertrophy not only of both lateral lobes but of the middle



Fig. 218.—Hypertrophied prostate removed at operation, showing enlargement primarily due to development of lateral lobes. Note how catheter passes through the tunnel-like prostatic urethra.

lobe as well (Fig. 219). Note how the latter stands like a sentinel at the end of the canyon formed by the lateral lobe, so as to act like a valve-like obstruction which not only prevents the urine from being expelled, but deflects the ordinary soft-rubber catheter (Fig. 219). A study of such a specimen will serve better than any description to enable you to understand the great advantage of employing rigid, that is, hard-rubber catheters with a special curve near the tip in order to pass such an obstructing middle lobe. You can readily see how easy a pouch

can be formed behind such a middle lobe in which urine is retained (Figs. 224, 225) after the ordinary act of micturition. The urine which is obtained by catheter from such a pouch is called the residual urine, and to the depression or pocket on the floor of the bladder the name "residual pouch" has been applied.



Fig. 219.—Typical hypertrophy of the prostate showing enlargement of the middle and both lateral lobes. Note how the catheter is deflected from its course by the projecting middle lobe.



Fig. 220.—Collar-like prostate removed at operation showing an almost symmetric hypertrophy in a ring-like manner of the prostatic tissues. *Ur.* indicates the unavoidable removal of a portion of the prostatic urethra with the prostate (see text).

From the description which I gave at the beginning of this lecture of the location of the various groups of tubules in the embryo (Figs. 216, 217) it is not surprising to observe how accurately the specimens removed at operation correspond to the relations and locations of the lateral and median groups of tubules in the embryo (Figs. 216, 217).

It is a matter of almost daily experience to find conditions such as were noted in the two prostates which we have just studied.

In the majority of patients we find either an enlargement of the lateral lobes alone (Fig. 215) or of both lateral and middle lobes, or finally a predominant hypertrophy of the middle lobe alone.



Fig. 221.—Posterior view of prostate at operation showing how urethra is also completely surrounded by a more or less uniform hypertrophy of the lateral and anterior lobes. Note how the middle lobe projects into the lumen of the urethra.

Were it not for the work of Lowsley and others on the embryonic urethra and prostate it would be difficult to understand such specimens as those which I will next present (Figs. 220–224). This (Fig. 220) is a specimen recently removed through the suprapubic route which illustrates what has been called the “collar” prostate. The entire urethra is surrounded (Fig. 220) in a ring-like manner by prostatic tissue. One cannot distinguish even upon the closest inspection any individual lobe. I find but little mention in any of our books on Urology of this “collar”

type of prostate. Its importance both from the standpoint of urinary obstruction as well as of difficulty in removal is not to



Fig. 222.—Anterior view of prostate removed at operation showing a development of two lateral and a middle (intra-urethral) lobe. The relative location of this intra-urethral lobe is well shown in Fig. 219.

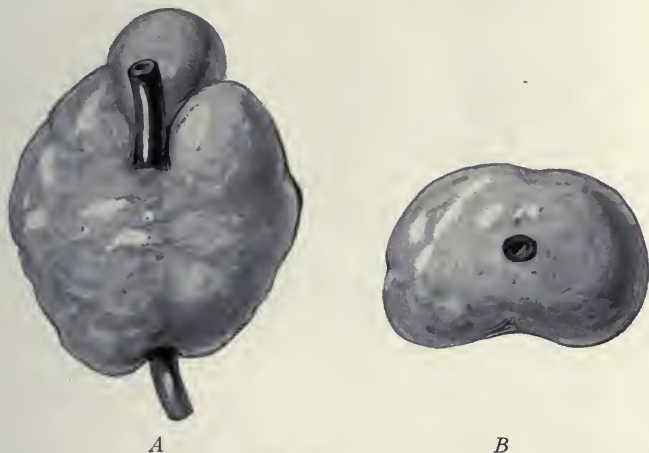


Fig. 223.—Two views of a prostate removed at operation: *A*. Note how the catheter lying in the prostatic urethra passes through a tunnel formed by the almost uniform enlargement of all the lobes of the prostate. *B*. This indicates the uniformity of the enlargement of all portions of the prostate in an annular manner.

be underestimated. The chances of the formation of a stricture at the vesical neck in such cases is much greater in my opinion, because it is impossible to secure a line of cleavage between the

mucous membrane of the prostatic urethra and the gland proper. Upon examination of the specimen after operation one not in-



Fig. 224.—View from above of bladder and prostatic urethra from an autopsy performed upon a man eighty-three years of age with intraperitoneal rupture of the bladder and secondary generalized peritonitis. This specimen shows a hypertrophied prostate due to enlargement of both lateral and middle lobes. Note (*a*) how greatly the prostatic urethra is lengthened, (*b*) the trabeculated condition of the bladder wall with several small calculi lying in false diverticulæ between the trabeculæ, and (*c*) the site of perforation in the intraperitoneal portion of the bladder as indicated by arrow which has been placed upon a piece of wood inserted through the site of perforation.

frequently finds a portion of the prostatic urethra (Fig. 220) still attached.

Another instructive specimen was removed from an old gentleman of eighty with marked symptoms of urinary obstruction. When looked at from the front we notice (Fig. 222) an almost complete envelopment of the prostatic urethra by two lateral lobes which show so little separation above and below as almost to constitute a typical "collar" prostate. An unusual feature seen particularly well, when the specimen is viewed from behind (Fig. 223), is the presence of a middle lobe which is relatively small. Instead of having developed into the lumen of the bladder, as usually occurs in cases of middle lobe enlargement, the small middle lobe protrudes upward through the floor of the prostatic urethra, thus pushing the two lateral lobes apart. This intra-urethral middle lobe (Figs. 222, 223) causes the urethra to be divided in a Y-like manner much earlier than when it developed into the bladder itself (Figs. 224, 225). It is not difficult to understand why such an intra-urethral lobe should have caused early and persistent urinary obstruction.

A typical example of a "collar" prostate which was very difficult to enucleate because of its very firm consistency is shown in the next specimen. The annular arrangement of the hypertrophied tissue is well shown (Fig. 223). The thickness of the almost symmetric enlargement was sufficient to give rise to the symptoms so typical of prostatic hypertrophy at the age of fifty-two. The removal of the organ has resulted in complete relief of all of the obstructive symptoms. One can only understand such a uniform circular hypertrophy if we assume that practically all of the groups of tubules (Figs. 216, 217) found in the embryo have taken part in the enlargement, and that there are no firmly knit lamellæ of fibrous tissue separating the original embryonic masses of cells.

Before closing this presentation of specimens of the various types of hypertrophied prostates which we have removed in this clinic let me show you a specimen removed at autopsy from a man of seventy-four who had been struck by an automobile and admitted to my service about twenty-four hours later.

The evidences of generalized peritonitis were so marked when I first examined him that operative interference was deemed

inadvisable. He died a few hours later, and at autopsy a perforation at the vertex of the bladder was found communicating

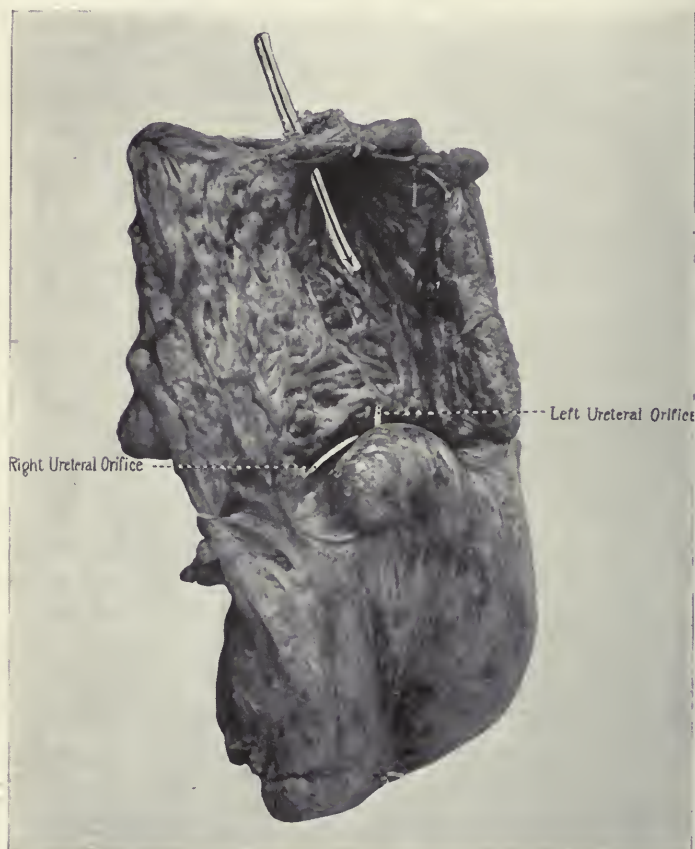


Fig. 225.—Another view taken a little more laterally of the same autopsy specimen shown in Fig. 223 in order to show how the middle lobe forms the anterior margin of the residual pouch. The orifices of the ureters are indicated on each side. Their position at the bottom of the residual pouch renders it easy to understand how reflex of urine may take place into the ureters and thus cause pyelonephritis in cases of hypertrophied prostate.

directly with the peritoneal cavity (Figs. 224, 225). The fulminating character of the clinical symptoms of peritonitis were found to be due to the escape of infected urine through

the perforation from a bladder which showed in a most typical manner all of the changes incident to obstruction by a hypertrophied prostate (Figs. 224, 225).

The principal features of interest are: (a) An enlargement of both lateral and of the middle lobes; (b) the great lengthening of the prostatic urethra as the result of the hypertrophy of the lateral lobes; (c) the forked or Y-like manner in which the urethra divides because of the presence at the vesical neck of the middle lobe; (d) the presence of a residual pouch behind the middle lobe; (e) the marked trabeculization of the bladder wall as the result of the obstruction to the outflow of urine; (f) the calculi lying in false diverticula or hernial protrusions between some of the trabeculæ, especially well seen when the specimen is viewed from the side (Fig. 225). The ureteral orifices lie so far behind the enlarged middle lobe that they would be very difficult to find should ureteral catheterization become necessary.

Before closing this lecture let me show you a cystogram showing the changes which not infrequently occur after removal of the hypertrophied prostate. It does not seem to make any difference whether the perineal or suprapubic route is used. About two years before I was consulted a suprapubic prostatectomy had been performed by a surgeon of large experience in this field. One year later the urination became painful and frequent. Shortly afterward the urine became bloody and small particles of phosphatic material were passed. When the patient was first seen by me cystoscopy was impossible on account of the intolerance of the bladder and a reduction in capacity to less than 3 ounces. I was able, however, to inject an opaque medium and take a radiograph which revealed a condition to which A. Hyman, of New York, has directed attention. A pouch is formed where the prostate was removed which forms the outer or distal half of a dumbbell-like enlargement of which the bladder proper forms the inner or proximal half (Fig. 226). This peculiar picture is not infrequently found in cases where the cavity from which the prostate has been removed fails to be obliterated and is separated from the lumen of the bladder proper by a diaphragm of tissue.

In this case I found, upon reopening the suprapubic incision,

the cavity from which the prostate had been removed to be the seat of an intense infection with the walls so firmly encrusted by phosphatic material that it was almost impossible to remove. The lumen of the bladder was extremely small and was separated



Fig. 226.—Cystogram taken two years after removal of hypertrophied prostate through suprapubic route (see text). The upper circular half of the hour-glass-like shadow is due to the opaque medium filling the greatly contracted bladder (capacity 3 ounces), while the irregular distal half shows the pouch left after removal of the prostate. The wall of this pouch was lined with phosphatic incrustations.

from the prostatic pouch by a circular shelf-like septum with a central opening permitting communication between the two cavities. The patient left the hospital greatly improved after prolonged drainage.

CLINIC OF DR. CAREY CULBERTSON

COOK COUNTY HOSPITAL

THE MANAGEMENT OF GENERAL PELVIC PERITONITIS

Summary: Acute pelvic peritonitis—differential diagnosis—treatment—indications for operation. T-shaped incision for posterior colpotomy. Radical operation by abdominal route—peritonization of pelvis. Technic and results in present case.

THE patient whom we have for presentation this morning demonstrates the management of general pelvic peritonitis in certain of its various manifestations. She is a young colored woman, twenty-two years of age, who is single and works in a factory. She came into the hospital on November 16, 1919, complaining of pain in the lower abdomen, not localized but extending entirely across, from one iliac region to the other. The onset occurred ten days ago with swelling of the lower abdomen and with sharp cramp-like pains in the right side. For the first days there was considerable rectal tenesmus. Backache began four days ago and she vomited once, November 17th. For the same period of time she has had headache. She thinks that she has had some fever, but there have been no chills, and for the last few days she has perspired profusely. Her temperature on entrance was 102.2° F., pulse 140, and respirations 26. The blood count was 16,400 leukocytes and 80 per cent. hemoglobin.

Her menstrual history is as follows: It appeared first at thirteen years of age, was regular every twenty-eight days, lasting three days, moderate in amount, and associated with some pain at the onset. The last period was normal in time and character. There have been no pregnancies. She has had a vaginal discharge for four months which has grown increasingly profuse. There is no history of any dysuria or other vesical symptoms, nor

of gastro-intestinal symptoms until the last four days, since which time she has been markedly constipated.

Examination reveals the following situation: She is a well-developed, slender young woman, with normal heart and lungs. The abdomen is distended, tender, tympanitic laterally and above the umbilicus, and dull on percussion below, or between the umbilicus and symphysis, and in both iliac regions. There is marked tenderness and rigidity below the umbilicus, and a resistant mass extending above the symphysis for a hand's breadth, with rigidity of the lower abdominal wall. Vaginal examination shows a moderate relaxation of the vaginal introitus with bulging of the fourchette and perineal body. The cervix is elevated, half-way up behind the symphysis and forward, small, closed, conical, but fixed. The posterior culdesac is occupied by a fluctuant, boggy mass, pushing down the posterior vaginal wall and the rectovaginal septum as far as the perineum. The corpus of the uterus and the appendages are not definitely palpable, though the corpus appears to be in the mass palpated above the symphysis.

The diagnosis here would appear to be an acute general pelvic peritonitis, in all probability centering about a bilateral pyosalpingitis, the inflammatory reaction invading the entire pelvis and extending up into the lower abdomen.

By way of differential diagnosis we would have to consider, of course, such other conditions as parametritis, free pus in the pelvis, ruptured ectopic pregnancy, appendicitis, and possibly diverticulitis.

Parametritis is more often an expression of puerperal infection. In this case there has been no preceding labor or abortion.

Free pus in the pelvis or free pelvic abscess may, of course, accompany pyosalpingitis, and that may be one part of the condition here presented. Certainly there is a fluctuant mass in the posterior culdesac, in all probability an accumulation of pus, which is free or encapsulated in a distended tube or ovary.

Ruptured ectopic pregnancy has frequently to be differentiated from pelvic abscess, particularly where the hematocele occupies the entire pelvic cavity. In this particular case there is nothing

in the history to suggest ectopic pregnancy. However, we do not leave it out of mind in the consideration of a case such as this.

Appendicitis is, of course, always to be considered, though very seldom even after a ruptured appendix do we find the pelvis occupied by so extensive an abscess as we have here. Likewise, the patient is not sick enough to render a diagnosis of ruptured appendix the most probable thing. Nausea, vomiting, chills and fever, and a higher leukocytosis almost invariably accompany suppurative appendicitis.

The treatment of acute pyosalpinx, which is our diagnosis in this case, consists of rest in bed. To avoid abdominal operation in these cases so long as they are in the acute stage our patients without exception are put to bed and kept there; not permitted to get up and be about the ward as long as they are febrile. As a rule, in three to five days the fever subsides and the patients then become quite comfortable and at times are difficult to keep in bed. If, however, they are allowed to rise and go about, they will again become febrile. We prefer to keep them quiet, that is, obtain an afebrile condition for at least two, and if possible three, weeks before attempting an operation. It is true, of course, that occasionally, but rarely, one of these cases will entirely clear up, where the pathology, for instance, has been limited to the tubes. As a rule, however, this process becomes chronic and operation eventually has to be undertaken. By waiting this long the patient's condition improves and she is in better shape to stand laparotomy. The entire pathologic process has subsided in some degree, if not considerably, and hence the extirpation of the diseased tissues may be less radical. From a technical point of view it is of great surgical advantage to defer operation for the reason that the surgeon can then peritonize the raw areas much more successfully. Peritonization should accompany every operation requiring enucleation in the female pelvis, and it cannot be done successfully when the operator is confronted with a red, acutely inflamed peritoneum; that is to say, postoperative adhesions are best prevented by not operating during the acute stage of these infections.

Occasionally a patient comes in where there is already a fluctuant mass occupying the pelvis, such as this one. The question arises as to whether it is best to evacuate large quantities of purulent material through the vagina or to allow it to remain for absorption. In my experience I find it distinctly to the advantage of the patient to evacuate any considerable quantities of pus by posterior colpotomy and incision. It is this which I propose to do at this time.

If the patient does not become afebrile within a few days on being put to bed and kept quiet, but, if on the contrary, she continues to run considerable fever and has chills, you may be quite sure that an abscess is developing, upon the evacuation of which the fever subsides rapidly and the chills cease. Hence, while I do not advocate drainage by posterior colpotomy in acute pyosalpinx as a routine measure, there will appear an occasional case in which such procedure distinctly benefits the patient and prepares her for the curative operation more quickly and with less strain upon her vital resources.

The patient has been prepared in the lithotomy position and anesthetized with nitrous oxid and oxygen. It is not necessary to anesthetize deeply for such a relatively minor procedure as posterior colpotomy. The vagina is exposed with a posterior hanging speculum and a short-bladed anterior retractor is introduced for exposure of the cervix. This is not readily seen, as it is up behind the symphysis. It is grasped with two volsella by its posterior lip, and in this particular case pulled down rather than forward, as it is already forced as far forward as it can be. The incision is carried from the right side to the left directly behind the posterior lip and about $\frac{5}{8}$ inch above it (Fig. 227). Where free pus is present in the posterior culdesac in large quantities this incision at once evacuates it, for the reason that the peritoneum is pushed down against the posterior vaginal wall and the knife goes directly through into the pelvic cavity with the first incision. This method also at once evacuates free pus in the parametrium where the peritoneum is elevated by the swelling and so pushed up away from the posterior vaginal wall, an incision then through the posterior vaginal wall being suf-

ficient to evacuate the pus. In this case you see an abundance of pus is discharged through this high incision. I now examine with the finger directly in the culdesac and feel a large fluctuant mass on either side. These are, in all probability, accumulations

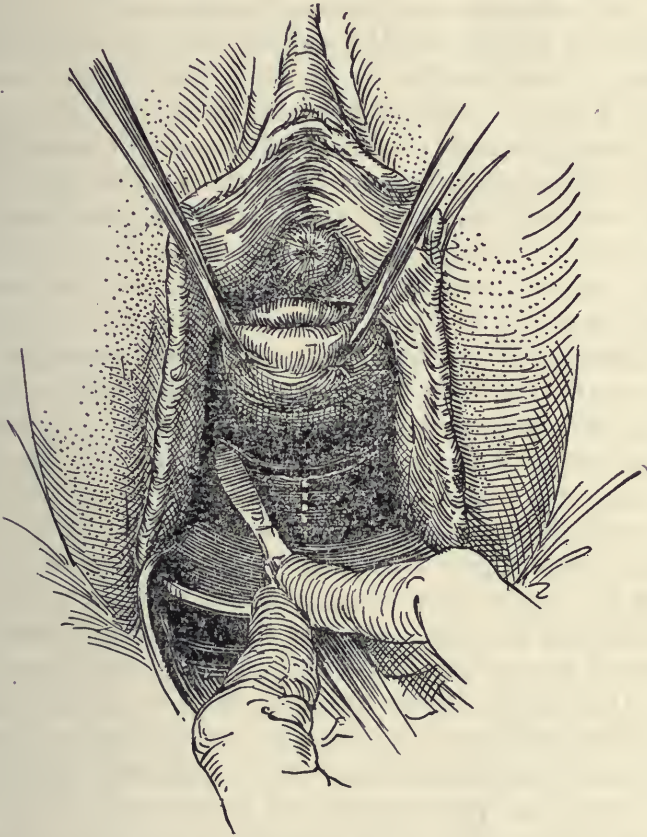


Fig. 227.—Incision back of posterior lip of cervix for drainage of pelvis; dotted line indicates extension of incision to make T-shaped opening which is slow to close, and thus gives greater assurance of adequate drainage.

of pus within distended tubes. I now pass a curved 8-inch clamp along my finger into the mass on the right side. The clamp goes in readily, and when I spread the blades the pus again rushes out. Similarly, I now evacuate the abscess on the left side.

The pus having been practically all discharged, I now extend the incision into a T-shaped one (Fig. 227). With the scissors I cut the posterior vaginal wall in its midline from the previous incision downward toward the rectum. This incision, however, need not be carried very far. It is sufficient to make a short one. The advantage of a T-shaped incision over a simple transverse one is that the wound remains open better for subsequent drainage. One objection to posterior colpotomy is that the wound does not remain open sufficiently long to permit all the pus, broken-down material, and débris to be evacuated, the process requiring sometimes several weeks. The tendency on the part of the incision is to close and thus permit reaccumulation of material. By enlarging the incision downward, as I have just explained, it is less apt to close up too soon. I now introduce a strip of rubber tissue. This is not a pack, but is merely a one-yard roll of gutta-percha tissue 1 or 2 inches in width, placed in the pelvis loosely and then loosely into the vagina and out of the vaginal introitus, for the purpose of draining rather than packing. The rubber tube which is used by some operators for drainage in these cases I have never employed. The volsella are now removed from the cervix and the speculum from the vagina. The patient will be sent back to bed and the rubber tissue drain removed in twenty-four hours.

December 12, 1919: On this date the patient presents a condition but slightly modified from that seen last month. It had been hoped that the evacuation of a considerable quantity of pus from the pelvis would make it possible for the acute inflammatory reaction to subside. This has occurred only in part. The patient has been kept quietly in bed in the low Fowler position, but has continued to run some fever. There have been no chills, no nausea or vomiting, but the temperature, while lower than formerly, still shows some degree of fever. There are times when for a day or two it will be quite normal. At other times it varies from 99° to 100.5° F. The leukocytosis has subsided in some degree, the last count showing 12,700 white cells. She has, however, continued to have considerable pain in the lower abdomen, and the tenderness and rigidity, while less

marked, are still present in some degree. Her appetite, unfortunately, has not been good and she has not gained in strength sufficiently to warrant waiting longer before attempting operative cure. The findings are much as before, except that the masses in the pelvis are smaller and the bulging downward of the posterior vaginal wall is no longer present. I am satisfied that the reason for the continuance of the temperature in her case is due to the involvement of certain structures in the lower abdomen. Cases such as hers have been observed before where rest in bed has not been sufficient to bring the patient out of the febrile state, and in every instance there has been more or less involvement of the abdominal peritoneum, if not, indeed, of the intestine, chiefly the cecum or the lower segment of the ileum. The sigmoid flexure is so frequently involved in these cases even where the tide of peritoneal involvement has not risen above the pelvis that it does not seem to be a factor in maintaining sufficient peritoneal reaction to keep the temperature elevated. Suspecting some intestinal involvement in this case, I have, therefore, determined to go ahead and operate by laparotomy without further delay.

Upon opening the abdomen, as you see, a coil of the ileum with the edge of the omentum is densely adherent entirely across the lower abdominal wall from one side to the other. The walls of the ileum are infiltrated, and upon freeing it we find raw areas over more or less of its surface for a space of 10 inches from the cecum. We examine the ileum only closely enough to be certain there are no perforations, and then push it back beneath the laparotomy pack. The entire anterior culdesac is seen to be obliterated by adhesions between the bladder and the uterus. The former is pulled up until the fundus of the uterus is covered by it. Upon freeing the bladder the corpus of the uterus is seen to be small, soft, boggy, upright, and densely fixed between the two lateral masses, these masses representing the appendages and the infiltrated broad, round and infundibulopelvic ligaments filling the pelvis laterally and posteriorly, so that the entire posterior culdesac is occupied by them, with extensive infiltration spreading into the walls of the rectum. The sigmoid

flexure is, strangely enough, free, not more than 7 or 8 inches in length, somewhat unusually short. As I free them the tubes are seen to be thickened, clubbed, kinked, and closed. The left ovary is about three times larger than normal. It is soft and fluctuant and forms a common abscess with its tube. The right ovary is but slightly enlarged, is soft and edematous, and may be freed from the right tube. The cecum is unusually long, 5 or 6 inches at least in length, and is adherent to the right pelvic wall with the appendix running up the ascending colon on its inner posterior side and adherent to its tube. The omentum is thin and free except where it is adherent to the anterior peritoneum and to the bladder along its edge.

In a previous clinic (October, 1919, Vol. 3, p. 1275) I demonstrated the technic of bilateral pyosalpingectomy for pus-tubes with defundation of the uterus, a procedure which I reserve for the treatment of these conditions in young women. It would be desirable, perhaps, to leave a portion of the uterus in this case in order to preserve menstruation, but inasmuch as it is definitely metritic, and in the presence of such extensive ligamentary infiltration, I think it wiser to amputate it just above the vagina. We will, therefore, ligate off the left infundibulopelvic ligament and cut away the left tubo-ovarian abscess; then the round and broad ligaments, in turn, care being taken in the ligation of the uterine artery on this side. It is seen that there is considerable infiltration extending into the broad ligament, indeed, as far as the pelvic wall, while the infundibulopelvic ligament is thickened and somewhat boggy. Indeed, there is no part of the pelvic walls here under inspection in which there is not some swelling. On the right side we will leave the ovary attached to its infundibulopelvic ligament, ligating between the tube and ovary, thus enucleating the tube on this side, and again ligating and cutting away the round and broad ligaments until we have reached the cervix. The bladder, having been freed from the anterior uterine wall and dissected from the cervix and held away, the anterior cervix is seized by a volsellum and held up so that the uterus can be amputated at about the level or just below the internal os. Amputation is done by a

transverse, wedge-shaped incision and the specimen removed. The remaining portion of the cervical canal is now treated with the cautery. At white heat it is introduced into the cervical canal for the purpose of destroying the mucous membrane. It is thought that this is particularly valuable in cases of inflammatory involvement of the whole uterine body as a prevention of subsequent leukorrhea. It has been found that after subtotal hysterectomy occasionally there is a somewhat persistent and troublesome leukorrhea.

The two raw edges of the cervical stump are now sutured together with moderately heavy iodine catgut on a curved cutting needle. Included in this suture are the free ends of the two round ligaments which are caught between the raw edges of the stump and securely fixed there by the through-and-through suturing. In doing this I also take pains to undersew the last ligatures that were placed at the bottom of the broad ligaments. This is merely to reinforce these ligatures and thus add one more safeguard aimed at the prevention of postoperative hemorrhage.

The question of peritonization in cases such as this has been regarded by us as of considerable moment. Where one is doing a hysterectomy in a clean case it is relatively easy to whip over the raw edges and bury the stumps of the few ligatures used with a continuous catgut suture running from side to side, and burying the stump of the cervix. Such a simple method of peritonization, however, will be entirely ineffective in a case like this, where the entire pelvis from the one side to the other is an area of raw surface. In the majority of cases of pyosalpinx it is usually only the posterior culdesac that is involved, the anterior pouch remaining free. Here peritonization essentially involves merely covering over the posterior culdesac. In past years we have attempted a variety of methods of covering these raw surfaces. I have at times transplanted peritoneum, but that is difficult to obtain in sufficient quantity. In other cases I have transplanted sheets of tissue taken from the omentum in an effort to cover and preserve the posterior culdesac. These methods are tedious, difficult and time-consuming, and none too

effective. In the previous clinic referred to above I demonstrated the covering of the posterior culdesac by bringing the sigmoid flexure over it as far as the round ligaments, the anterior culdesac in that case being free. Inasmuch as in this case the raw areas are considerably more extensive, it will be necessary to modify this method of sigmoid flexure peritonization to a considerable extent. The sigmoid flexure here, as we demonstrated, is free, but none too long. When I place it over the pelvis it is seen that it will not serve without undue tension to cover the entire raw surface. Fortunately, however, on the right side I have a long cecum, which you see is quite mobile since it has been freed from the right tube and ovary. Beginning at the point where the sigmoid flexure is reflected from the left pelvic wall, I start a continuous suture of light iodine catgut on a curved round needle and lightly whip the sigmoid to the left pelvic wall, care being taken only to carry it as high as the raw surface extends. It is carried up along the left pelvic wall, over the round ligament and over the bladder, to the anterior parietal peritoneum along the line where the ileum and omentum were attached when we opened the abdomen. Arriving at the mid-point directly below the lower angle of our laparotomy incision we stop with an interlocked stitch. In placing this suture attention is called to the point that it has utilized the fat tabs of the appendices epiploicæ, with which this sigmoid has been well supplied, so that but few stitches have passed directly into the gut wall.

In order to employ the mobilized cecum on the right side as I have the sigmoid on the left I must first remove the appendix. This is freed from its adhesions along the ascending colon and is extirpated by the technic already described in a previous clinic (Vol. 4, No. 1, p. 179, February, 1920). In short, it is done as follows: The appendix is seized at its tip and clamped. The meso-appendix is ligated with heavy catgut ligature. The appendix is then grasped with a short clamp low down, well against the wall of the cecum, and a second clamp is placed $\frac{1}{4}$ inch above this and the appendix is removed by cautery. The opening in the cecum is then closed after removing the clamp by

an over-and-over continuous linen suture, which is carried once across and then once back, thus burying the appendix stump by two rows of linen. Over this a Czerny-Lembert suture of light catgut is passed, beginning as high up on the ascending colon as the raw area produced when the appendix was freed. This is brought down over the stump of the meso-appendix and on over the cecum far enough to bury the linen just introduced.

With another piece of light iodine catgut on a second curved round needle I now begin at the point where the mobilized cecum is reflected from the right pelvic wall and whip it lightly to the parietal peritoneum exactly as the sigmoid flexure was attached to the left side. I have no difficulty whatever in bringing the cecum up to the midline anteriorly, the point corresponding to where we left off with the sigmoid flexure. It is now seen that the entire pelvis from side to side is walled off from the abdomen, and that a clean peritoneal surface presents on the intestinal side of the cavity (Fig. 228). It remains only to cut one of these catgut sutures after tying the two together. We carry the other one down the midline, uniting the edges of the sigmoid flexure and cecum as they lie in close approximation. This suture terminates in the angle between the rectum and cecum at the posterior border of the pelvic shelf, thus closing the posterior entrance into the pelvic cavity. Thus the entire pelvis with its raw surfaces and infiltrated rectum and bladder are blocked off hastily but very effectively from the upper abdomen.

It remains now to take care of that portion of the ileum which was adherent when we first opened the abdomen. Here we find, as we previously described, a portion of the ileum with infiltrated and thickened walls, the whole structure being quite as thick as one's wrist for about 10 inches from the cecum upward. Upon closer examination it is seen that while the walls of the ileum are not perforated, its muscular coats remaining intact, there is very little peritoneum left. This involvement of the small intestine used to be one of the most unpleasant propositions which the abdominal surgeon had to confront. To leave a mass such as this guarantees postoperative adhesions. It is to prevent adhesions to the small intestine that so much care and pains are

now exercised in peritonizing all raw surfaces. Adhesion to the sigmoid flexure without marked kinking does not produce pain

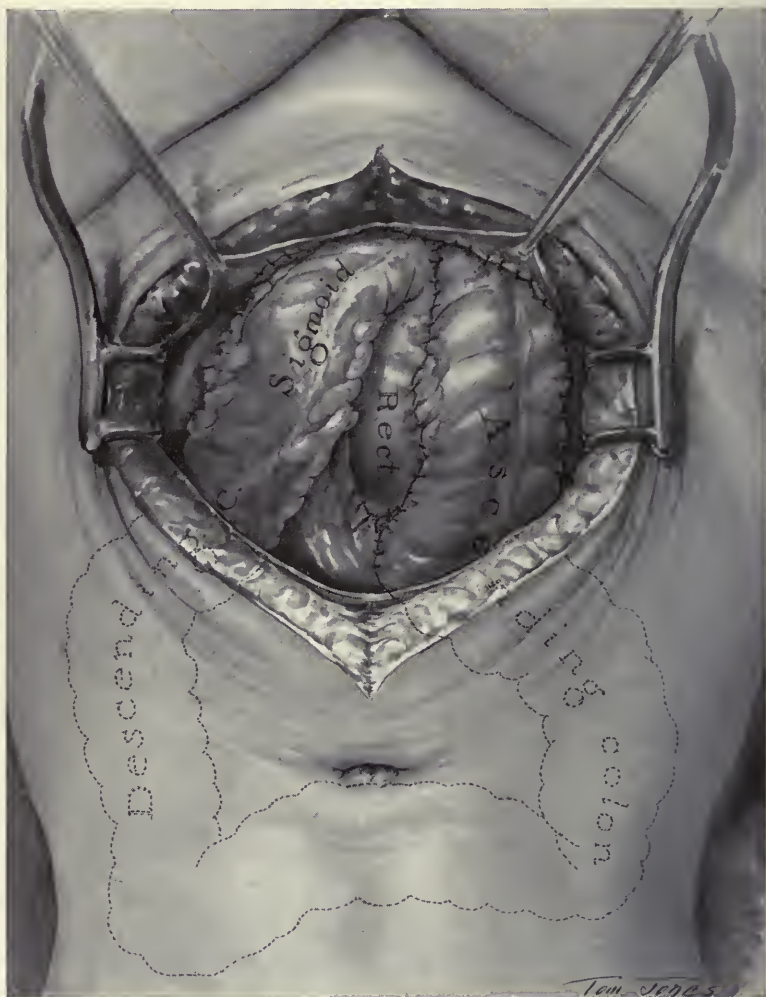


Fig. 228.—Completion of peritonization of pelvis after radical operation for general pelvic peritonitis.

or intestinal obstruction. Fixation or mobilization of the cecum does not seem to create any postoperative difficulty. But

involvement in adhesions of the small intestine, especially of the ileum, is universally associated with kinking, and is the one thing most desirable to prevent, since here we have the factor in subsequent pain and partial or complete intestinal obstruction. Today we meet this situation in a somewhat radical yet simple and effective manner. The walling off of the raw pelvis has been accomplished. I now deal with the raw area of the ileum. I find here a large, thin omentum free from infiltration and with merely a raw edge where it was adherent with the ileum to the anterior parietal peritoneum. I ligate off from the free edge of the omentum a strip $3\frac{1}{2}$ inches wide entirely across its breadth and cut the ligated portion entirely away. This gives me a sheet of tissue amply large to entirely cover the raw area of the ileum. With a very light iodine catgut suture on a small curved, round needle I now hastily suture this to the ileum as a patch, being careful to turn under the raw edge. It is sufficiently long not only to cover the actual gut wall along the length of the raw area but also to allow it to be whipped to the mesentery so that all the gut wall is covered by the suture. Covering the raw areas of the ileum by omental transplants is a procedure which I use whenever necessary, and have found it to be very satisfactory. This leaves the ileum, as you see, well covered, no raw areas exposed, and it can now be dropped back into the abdominal cavity without danger of its becoming adherent. The raw edge of the omentum is now turned under by another continuous light suture.

Further exploration of the abdomen reveals a normal gall-bladder, stomach, transverse colon, and normal kidneys. The abdominal incision is now closed without drainage in our routine manner, the technic of which we have previously demonstrated. The patient will be returned promptly to bed.

Postscript (three weeks later): The patient made an entirely satisfactory convalescence and was discharged from the hospital on the twentieth day.

CLINIC OF DR. GEORGE E. SHAMBAUGH

PRESBYTERIAN HOSPITAL

DEAFNESS IMPROVED BY USING ARTIFICIAL EAR-DRUMS

Summary: Diagnosis. Hearing restored by the use of a roll of cotton. Physiology of the membran tympania. Type of case in which artificial drum membranes may be of value. Folly of indiscriminate use of so-called "artificial ear-drums."

THE patient, a man aged forty-nine, consulted me in October, 1919. He stated that his ear trouble developed from infection in the middle ear, resulting from diving many years ago. He had a long period of discharge from both ears and there is still some moisture appearing, but it is of no special annoyance to him. The defect in hearing has dated from the active period of the discharge. He is not annoyed by tinnitus aurium, and he finds that while the hearing in the left ear is apparently constant, there is a marked fluctuation in the right ear. This is often influenced by efforts to wipe out the ear with cotton. His hearing will suddenly improve and the improvement may last for the larger part of the day before it will lapse. For many years his ears were treated by one doctor after another, using irrigation as a method for getting rid of the excessive discharge. The patient discovered on his own account that irrigation of the ears affected them unfavorably and that it tended to keep up and increase the discharge.

On examining the case I found that there had been complete destruction of the membrana tympani in both ears. The malleus and incus in both ears had also disappeared. A probe could be readily passed into the attic and out toward the antrum. Apparently the head of the stapes had also disappeared. There was a very slight mucous discharge, which was about the same in both ears. This discharge had no offensive odor whatever,

although nothing had been done in the way of treatment except to wipe out the ears with pledgets of cotton, which the patient did himself.

In making a functional examination I found that the whispered voice could not be heard in the right ear and was heard at a distance of 1 foot in the left ear. There was a marked elevation of the lower tone limit. Bone conduction was prolonged. Rinne test was strongly negative in both ears, and an examination of the upper tone limit showed moderate deafness for the c^4 fork in both ears, and a rather extensive defect at the upper end of the tone scale when tested with the Galton whistle. Caloric tests, by blowing cold air into the external meatus, brought on a prompt response in both ears.

In spite of the extensive destruction of the drum membrane, with exfoliation of the ossicles, we could find no evidences of a bone-invading process. There must have existed at one time caries of the ossicles which resulted in their destruction, but the absence of any discharge distinctive of caries or any evidence of cholesteatoma formation, and the absence of offensive odor from the ear, eliminated at once the possibility of disease of the temporal bone. The question of a radical operation was also eliminated, since in neither ear was there evidence of a dangerous type of disease, and an operation would in all probability increase, rather than decrease, the difficulty he was experiencing in hearing.

The situation in this case seemed quite suitable for the use of an artificial ear-drum. Cotton was rolled in a small ball about the size of the head of a match, dipped in vaselin and placed directly over the niche of the oval window in the upper posterior quadrant in the right ear. The patient experienced an immediate response in the way of an improvement of his hearing. In testing with the whispered voice I found that the patient heard easily 16 feet, whereas previously the whispered voice could not be heard in this ear. The question arises: How was this improvement accomplished? There is certainly no vibrating quality in a moist pledget of cotton, yet this is usually found to be the most satisfactory means of improving the hearing in cases where a so-called artificial drum membrane is of assistance. It is

found that in these cases anything which weighs down the stapes, such as a pledget of cotton, a film of thin rubber, or even a droplet of oil placed in the niche of the oval window, will accomplish the desired result. The term "artificial drum membrane" is rather a misleading one, as it leaves the impression that the drum membrane is an important part of the hearing mechanism; that the destruction of the drum membrane means the destruction of hearing; that an artificial drum membrane is something which takes the place of the normal membrana tympani. All of these propositions are false. The drum membrane is not of much assistance in hearing. We frequently find patients with complete loss of the drum membrane with the hearing showing very little disturbance so long as the movements of the stapes are unimpaired. The improvement in hearing which is accomplished by placing a foreign substance in the oval window against the remnant of the stapes is not the result of this foreign substance taking the place of a vibrating drum membrane. It simply weighs down the stapes. The use of a ball of cotton, such as I employed here, is not entirely satisfactory, since the patient has difficulty in removing it and in cleansing the ear. The artificial ear-drum which one can buy on the market, a small circle of rubber to which a string is attached as a means of carrying this into the ear, is, on the whole, the best device, as the patient soon acquires the ability to place this in its proper position, which he does much more readily than can the physician. The charlatans have played upon the use of the term "artificial ear-drum." You will find in the popular magazines advertisements of artificial ear-drums which are sold to the public at an exorbitant price and are bought by persons suffering from deafness where the drum membrane is entirely normal. The only cases where a mechanical device which goes under the term "artificial ear-drum" is useful is just the type of case that I record here, where there is a marked defect in hearing in both ears with destruction of the drum membrane and where the improvement in hearing for the voice, from the application of the device, is sufficient to be of great assistance to the patient. A patient gets no benefit from buying one of the advertised, so-called artificial ear-drums.

I have several times seen patients who have brought on an increased injury to their ears by wearing one of these devices (which should have cost them at most 5 cents and for which they paid the sum of \$10) until the device had eroded through a previously normal drum membrane, causing, in addition to the deafness which was caused by bony fixation of the stapes, chronic suppuration of the middle ear.

CONGENITAL DEAF-MUTISM

Summary: Diagnosis. Differentiation of acquired and congenital deaf-mutism. Etiology and pathology of each condition. Great value of a remnant of hearing to a deaf-mute who is to be taught to speak.

THIS boy is two and one-half years of age. He has not made any effort to talk, and the parents have begun to suspect that he does not hear when spoken to.

Examination discloses no evidence of abnormality in the external or middle ear. No response whatever is elicited when one, standing behind the patient, makes a noise such as would ordinarily startle a child. In a child over six or eight months of age one has ordinarily very little difficulty in establishing a diagnosis of total deafness. It is much more difficult to determine partial deafness in a child under five or six years of age.

This case is undoubtedly one of congenital deaf-mutism and is very probably dependent on congenital deafness. A child may be a congenital deaf-mute, but yet be one with acquired deafness. The term "congenital deaf-mute" is applied to all cases of deaf-mutism where the defect in hearing has developed before the age when a child acquires the art of speech, that is, before the child is two or three years old. An acquired deaf-mute, on the other hand, is one where the deafness develops after the child has learned to speak. Almost all children who lose their hearing before the age of six or eight lose their ability to speak and become acquired deaf-mutes. Congenital deafness is caused by developmental anomalies, changes usually restricted to the cochlea, and where the vestibular part of the labyrinth remains normal. Congenital anomalies involving the external and middle ear are not so uncommon. One meets with complete absence of the auricle and external meatus, often bilateral. Such anomalies are rarely associated with defects in the internal ear. These cases, therefore, will be somewhat hard of hearing, but are not deaf-mutes.

In a child who is an acquired deaf-mute the destruction of hearing is due to diseased conditions in the labyrinth, causing total destruction of function, not alone of the cochlea, but usually of the semicircular canals as well. Epidemic meningitis is responsible for 50 per cent. of the cases of acquired deaf-mutism. Panotitis, a condition of diffuse suppuration of the labyrinth, developing in connection with a violent acute otitis media, such as one meets in scarlet fever and measles, is also responsible for many cases of acquired deaf-mutism. In acquired deafness the entire labyrinth is destroyed, whereas in cases of congenital deafness the defect is usually limited to the cochlea. In testing deaf-mutes, where the deafness has been acquired after birth, one gets no response from the vestibular mechanism, whereas in cases of congenital deafness the semicircular canals usually give a normal response.

Not a few cases of deaf-mutism are found to possess remnants of hearing. Where such "tone islands" are found in the lower part of the tone scale, that is, below g^2 , they are often of great value, since in this part of the tone scale falls most of the fundamental vowel sounds. In teaching the child the art of speech, if there is only a remnant of hearing, however imperfect, by which the patient may be able to hear the voice, this can be utilized in teaching the patient how to speak.

An effort is always made to teach a deaf-mute to speak, but in cases where there is not the slightest remnant of hearing the speech is always imperfect. The remnant of hearing, when utilized properly, makes it very much easier for a child to learn to speak in a way more nearly resembling the human voice. It is very important that deaf-mutism should be recognized early and that the education of the child be started at the proper time, at the period when speech is more readily acquired. Individual instruction is largely necessary, and this can be carried out more readily in an institution than at home. Both private and state institutions exist for this work.

LABYRINTHINE DEAFNESS WITH DIPLACUSIS

Summary: Diagnosis. Injury to the ear from concussion usually limited to the internal ear. Experiences in military hospitals. Diplacusis—mechanism of its production. Prognosis not unfavorable.

A YOUNG man aged eighteen consulted me November 10, 1911 because of tinnitus aurium and a defect in hearing in the left ear, which developed the day before while practising with the college band in a small room. He attributes the trouble to a loud drum which was being played close to his left ear. The trouble developed in the midst of work, when he discovered he was unable to hear when the man on his left addressed him. The boy had never had previous ear trouble.

Examination disclosed a normal drum membrane in each ear. No evidence of a nose or throat condition that might cause ear trouble. The whispered voice was heard normally in the right ear, and in the left ear 66, high-pitched number, is heard normally, while hearing for 82 is only about $\frac{3}{20}$. Weber is lateralized to the right side and there is no appreciable shortening of bone conduction. "C" fork, vibrating 64 times a second, is heard normally. "A" is also heard normally; "a¹", heard normally in the right, shows marked shortening in the left ear. The tone for this fork is heard as a much higher pitch in the left ear than it is in the right; "c⁴" is normal in the right, but much shortened in the left. The tone seems to be the same pitch in both ears. Rinne is positive right and left.

This case has two points of interest: one is the defect in hearing, which apparently is due to concussion; the other is the diplacusis, in that the patient hears a tuning-fork as a different pitch in the two ears.

As regards the injury to the ear from concussion: this injury is restricted, with few exceptions, to the internal ear. In examining soldiers returning from France we encountered a great many cases of deafness following concussion from high

explosives and also from injuries to the ear resulting from work on the rifle ranges. In the former type of case one occasionally met with a perforation of the drum membrane. As a rule, where the drum membrane ruptures there is likely to be less injury to the internal ear than where this remains intact. We see injuries to the internal ear resulting from shrill whistles, and degeneration of the eighth nerve is very commonly observed as occupational deafness in boiler-makers or in steel riveters. We are not accustomed to see an injury to the hearing resulting from the circumstances which occurred in this case, yet the circumstances associated with the development of the trouble seems to warrant the conclusion that his ear trouble resulted from the concussion. The symptom of diplacusis is a very interesting one. Its presence should always be accepted as an indication of changes in the labyrinth. Even in those cases where the ear trouble may be associated with distinct evidences of otitis media, I would not be inclined to attribute the diplacusis to a middle-ear process.

There seems to be but one rational explanation for the symptom, and that is that the vibrating mechanism in the cochlea, which by responding in different parts to tones of varying pitch has become altered, so that a particular area which should respond to one tone is now reacting to tones of a different pitch.

The prognosis in this case, I think, is not unfavorable. In most of the cases in soldiers, where an injury to hearing developed during artillery work, the defect was temporary, the cases recovering hearing in the course of a few weeks or months.

Experimental work where guinea-pigs have been exposed to a pistol shot near the ear shows that if the labyrinth is examined immediately after injury, there is a shattering of cells forming the organ of Corti. In other cases, where the animal was not killed for a period of a couple of months, some showed complete regeneration of the organ of Corti, while others showed complete atrophy of these cells. Of course, there is no treatment which one can carry out. The advice given in this particular case was to avoid repeating the circumstances under which the trouble developed.

LABYRINTHINE DEAFNESS WITH SOME UNUSUAL FEATURES

Summary: Diagnosis. Pathology of defect at lower end of tone scale. Differentiation of obstructive middle-ear deafness and disease of the internal ear. Treatment expectant.

THE next case is that of this young man, aged thirty, who first consulted me November 13, 1919, complaining chiefly of very annoying tinnitus aurium in the right ear. He was also aware of a defect in the hearing in this ear.

The patient's ear trouble developed while on shipboard returning from Europe. The onset was not associated with a head cold and there is no history of deafness in his family. The difficulty, he thinks, developed in the course of a few days.

In examining the patient we found the nasal passages, as well as the nasopharynx, normal. The tonsils were distinctly enlarged and showed more or less congestion, a situation which we would ordinarily term a form of chronic tonsillitis. The drum membrane on either side showed no thickening or retraction. Both drum membranes were quite transparent.

Testing the patient's hearing for the whispered voice, it was found that the hearing in the right ear was about $\frac{3}{10}$ and the left ear was normal. The functional examination with tuning-forks brought out the following facts: the Weber for both the "A" and "a¹" was lateralized to the normal ear, that is, to the left. There was no appreciable shortening in the duration of bone conduction. This is exactly what we expect to find where one ear is normal, even in cases where the affected ear shows a complete destruction of hearing. The Rinné in the right ear showed the duration of air conduction and bone conduction equal, whereas in the left ear the Rinné was positive. The Rinné test constitutes one of our most reliable tests in differentiating disease of the internal ear from deafness caused by obstruction in the sound-conducting mechanism. In severe unilateral deafness the Rinné is negative, whether the defect is due to obstructive middle-ear trouble or degenerative labyrinthine trouble. For this reason the chief value of the Rinné test is in bilateral deafness.

In testing the remainder of the scale it was found that the "c⁴" fork was slightly shortened in the right ear, but normal in the left, whereas for the Galton whistle there was only an appreciable shortening, which was the same in both ears. Testing the ears by air conduction, it was found that the "C" fork, vibrating 64 times a second, was heard only as a buzzing in the right ear and that indistinctly, while it was heard normally in the left. The "A" fork was heard only as a buzzing, but not as a tone, in the right ear, but heard normally in the left. Testing the ears for the "a" fork brought out a very distinct diplacusis. The fork was heard much higher in the affected ear than in the normal. The "c⁴," a high-pitched fork, vibrating 2048 times a second, brought out the same symptom, being heard as a higher pitch in the right ear than in the left.

There are two interesting features in these functional tests. One is the presence of diplacusis, which we have had occasion to discuss in reports of other cases. It fixes the diagnosis definitely as a disease of the sound-perceiving mechanism in the labyrinth of the ear. The second unusual feature in this case is the discovery that the defect in hearing is most marked for the lowest tones, whereas the upper part of the tone scale was heard normally. This is exactly the reverse of what we expect to find in cases of labyrinthine trouble, degeneration of the eighth nerve, etc. One of the most characteristic and reliable tuning-fork reactions in diagnosing the location of the deafness is the difference in the defect for high and low tones in the two conditions, obstructive middle-ear deafness and internal ear trouble. All obstructive middle-ear cases produce a defect most marked at the lower part of the tone scale, and it is equally characteristic of the usual case of internal ear trouble to find the defect more marked at the upper tone limit.

The situation found in this case, where our functional examination points unmistakably to a defect located in the labyrinth of the ear and where the lower tone limit is chiefly involved, I have met with in several cases. They have always been cases where the trouble has developed, as in this case, rather quickly. One case I recall was of a miner from the Lake Superior region. He

awakened one morning and found himself suffering from tinnitus aurium. A few weeks later, when he came to see me, I found the same reactions as shown in this case: diplacusis and a defect at the lower end of the tone scale.

Our knowledge of the physiology of tone perception leads us to believe that the perception for tones in the different parts of the tone scale takes place in separate and distinct parts of the cochlea. Everything points toward the basal coil as the seat of perception for high-pitched tones and the apex of the cochlea for the perception of low-pitched tones. For some reason, as yet unknown to us, degeneration in the internal ear, as well as in the eighth nerve, begins with destruction of the perception of the higher notes. With our conception of the physiology of sound perception it is very easy to understand how in internal ear trouble, especially when this is due perhaps to a slight hemorrhage with a clot restricted to a definite area, this can produce a defect at the lower part of the tone scale. All that is necessary is for us to imagine the location of the clot or exudate as occupying the apex of the cochlea, and that is what I believe has taken place in this and in similar cases where the disturbance is limited to the lower part of the tone scale. I believe that it is as likely that a small embolus has lodged in the apex of the cochlea as that an actual hemorrhage has taken place. This patient's chief complaint is his annoying tinnitus aurium.

The case is not one, of course, that could be improved by local treatment applied to the ear. Our treatments can only affect the sound-conducting mechanism, which is not at fault here. This is true of most cases of annoying tinnitus aurium. The tinnitus in this case is pretty sure to diminish and become less and less annoying as time goes on, and if one starts out by treating the ear by inflation, massage, etc., and keeps up the treatment long enough, the chances are that the ear will be under treatment at the time the tinnitus diminishes or disappears, but the relief of the symptom is in no way dependent upon these treatments. It is only where there is obstructive tubotympanic catarrh that we are justified in assuming that treatment such as inflation is likely to benefit the tinnitus.

CLINIC OF DR. CHARLES A. PARKER

COOK COUNTY HOSPITAL AND HOME FOR DESTITUTE CRIPPLED
CHILDREN

PROGRESSIVE FLEXION DEFORMITY OF THE FINGERS OF MUSCULAR ORIGIN—DIAGNOSIS AND TREAT- MENT

DEFORMITIES of the fingers resulting from injury or disease of the fingers themselves or their activating elements, muscles, tendons, and nerves, are fairly common and excite little special interest. The deformities of the various nerve lesions, of ischemic paralysis, and Dupuytren's contraction are familiar forms to the surgeon and neurologist.

The one I recently observed, however, appeared to be out of the beaten path and therefore of sufficient interest to be recorded. The patient was a healthy country girl fifteen years of age. She came to my clinic at the County Hospital in September, 1918 for relief of a deformity of the fingers of the right hand. When the right hand was extended straight at the wrist the little, ring, and middle fingers became flexed in varying degrees, the little three-fourths, the ring two-thirds, and the middle finger one-half of the normal active flexion of these digits. The index-finger was slightly flexed also. With the wrist maintained extended the fingers involved could not be extended passively beyond their flexed positions. Further flexion of the fingers, however, was active and normal. All joints of the fingers took part in the flexion (Fig. 229, 1).

On flexing the wrist all the fingers could be actively straightened as shown in Fig. 229, 2. This action immediately differentiated it from a Dupuytren's contraction, as that is purely a finger and hand deformity, and movements of the hand and wrist have no influence on the deformity.

From ischemic paralysis it differed in general appearances, and particularly in the readiness with which the deformity was

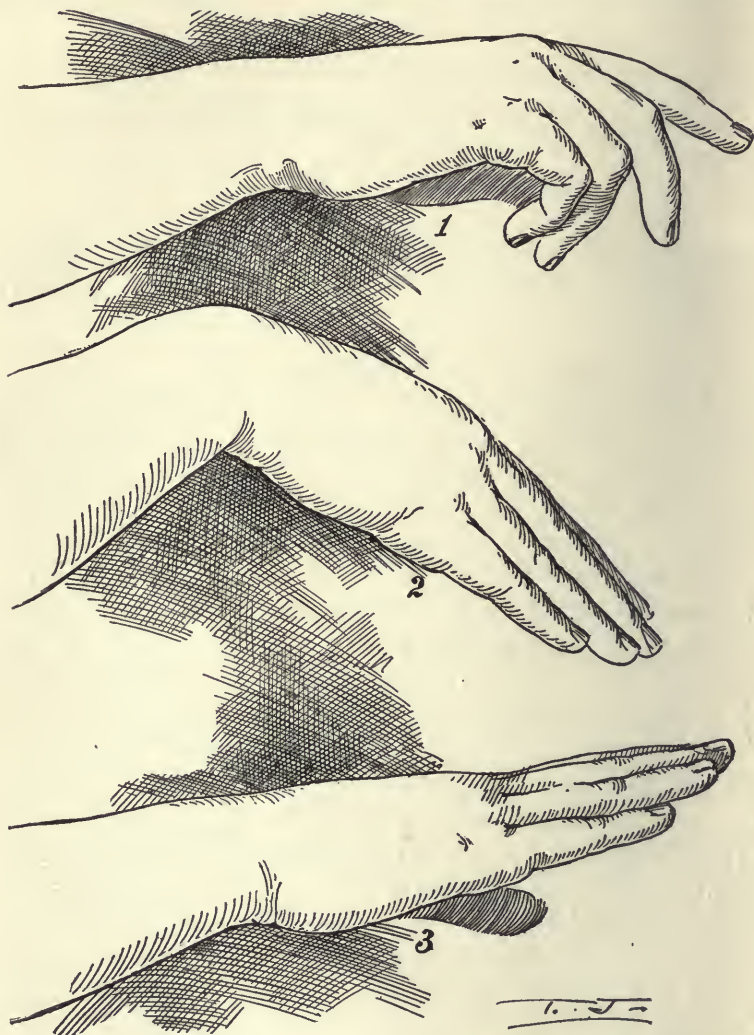


Fig. 229.—Progressive flexion deformity of the fingers of muscular origin.

completely overcome on flexion of the wrist and the active contractibility of the flexor tendons in the complete closure of the hand without extending the wrist. Moreover, it had been a

progressive affair, starting in the little finger first and gradually affecting the other fingers through a number of years. There had been no history and there was no evidence of trauma that might have caused it.

As for primary nerve lesions, its slow development and complete recovery after operation would apparently make it ineligible for poliomyelitis, and the postoperative course would rule out any present central process. At operation the two flexor tendons of each of the three fingers were lengthened on an average of about 1 inch. It was found that neither tendon lengthened alone allowed complete extension of the finger, but by lengthening both normal extension was obtained.

The hand and fingers were held in the corrected position for eight or ten weeks, and have been examined several times since, when function appears to be absolutely normal (Fig. 229, 3). Whatever the origin of the trouble, it manifested itself as a perverted muscular action of a progressive type.

TREATMENT OF BOW-LEGS AND KNOCK-KNEES

Summary: Gradual correction in younger children with plaster casts and other apparatus. Rapid correction by osteoclasis from three to five years of age, and by osteotomy when older.

BOW-LEGS and knock-knees are the commonest orthopedic deformities resulting from rickets. Contrary to the common belief that these deformities are the result of walking too early, they are observed much more frequently in children in whom walking has been delayed six months or a year on account of the general weakness accompanying rickets; and it is not at all unusual in orthopedic clinics to see those deformities in children two and three years of age who have never walked. There is a natural tendency for bow-legs to correct themselves, which does not obtain with equal potency in knock-knees when left unaided. While both conditions may be very disabling, in general, bow-legs are more of an esthetic affliction, while knock-knees greatly reduce the locomotive efficiency of the patient. The deformities usually reach their peak during the second and third years, the active period of rickets, and become fixed during the succeeding stage of bone hardening or eburnation.

During the early stage persistent use of full length rigid apparatus of iron or plaster of Paris will usually correct the deformities. Unless their use is maintained until hardening



Fig. 230.—E. J. Three years old. Before operation. Both legs are bowed below the knee.

has occurred recurrences are to be expected, and the results disappointing for the efforts exerted.

In the older cases fracture of the bones is the method of choice and the only method offering any certainty of results. During the stage of active rickets correction by fracture is open to the same objection as that of correction by braces, in that the parts must be held in position for a very long time, until eburnation occurs, and non-union is not uncommon. So operative treat-



Fig. 231.—E. J. in the Gratton osteoclast ready for breaking. The two restraining bars are on the inner side of the leg and the breaking bar just above the middle on the outer side with the assistant grasping the handle ready to make the fracture.

ment is deferred until x-ray or other evidence shows the rachitic process is over and the osseous structure normal. In practice we prefer the fourth and fifth years, when the bones are usually in condition for rapid union and still small enough to be broken with the osteoclast without open wounds. In older children the breaking bars of the osteoclast have to exert so great a pressure to fracture the bones that they cut the skin and other tissues between the bars and the bone. In children under five

years this very rarely happens; so rarely that in our routine work we never sterilize the region to be operated upon, and laceration of the skin seldom occurs. In the older children we use the open incision and cut the bones with an osteotome with the usual surgical precautions. In our clinics most of our work is with children of proper age and osteoclasis is our usual procedure. We use the Grattan osteoclast, quite the best instrument for this purpose. Its adjustability suits it for any size limb for the age

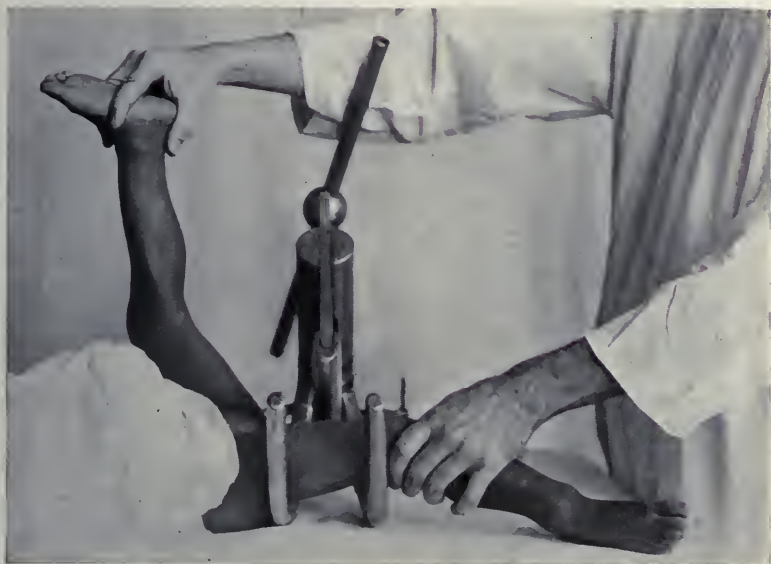


Fig. 232.—The position of the osteoclast for correcting knock-knees. The lower restraining bar is on the outer side of the epiphysis just above the line of the knee-joint and the breaking bar is on the inner side between the two outer ones.

at which it is used. In bow-legs the deformity is practically always in the bones below the knee, and they are broken with the single pressure bar on the outside and opposite the apex of the deformity whether this be in the upper or lower third of the leg or at some intermediate point. The bar on the outside breaks the fibula first and then the tibia, at the same time tending to correct the deformity. In knock-knees the single bar is put on the inside of the femur, usually closely above the knee.

The operation, of course, is performed under anesthesia. The fracture is made as rapidly as the rather coarse screw can be turned by means of the cross-bar handle.

The usual time required is from four to eight seconds. Immediately that the bones are felt or heard to break the pressure is just as rapidly relieved by reversing the action of the screw. The pressure bars are of polished steel and come in direct contact



Fig. 233.—W. W. Before correction by osteoclasis.



Fig. 234.—W. W. After correction.

with the skin. Three discolored areas corresponding to the position of the bars usually appear immediately after the fracture. They are slight in extent and cause no inconvenience. Attempts to mitigate the severity of this bruising by covering the pressure bars with rubber tubing or other material have been unsatisfactory, and the bare steel is the safest.

Immediately after the fracture the leg is put into a plaster-of-Paris cast extending from the toes to the perineum in bow-legs,

and to the navel, including the hip, in knock-knees. The deformity is corrected manually while the plaster is setting with a certain amount of apparent overcorrection in either case, so that a corrected bow-leg appears to be a slight knock-knee, and a knock-knee resembles a moderate bow-leg. Experience teaches how much overcorrection should be made in a given case. If the bones are suitable for normal union the casts are left on for



Fig. 235.—A. D. Before correction by osteoclasis.



Fig. 236.—A. D. After correction.

five or six weeks, when they are removed, and the child kept in bed and allowed to get up when it feels like it, usually within the week after the cast is removed. The several hundred such operations performed by various members of the staff of the Home have been remarkably free from surgical complications. No case of nerve injury has been observed and no fat emboli. Correction has not always been all that was desired and refrac-

tures have sometimes been necessary. In some of the more vicious deformities of the tibiæ presenting an angular bend forward of 90 degrees as many as four or five successive fractures have been made in the course of several years to gradually correct the deformity. In certain cases it is necessary to cut the tendo achillis to let the foot assume its proper position after correction.

I have had one fracture fail to unite following osteoclasis of a bow-leg in a child three or four years old. It has persistently



Fig. 237.—H. R. Before osteotomy. Knees $3\frac{1}{2}$ inches apart when malleoli are together.



Fig. 238.—H. R. After osteotomy. Patient has also greatly increased in weight.

failed to unite until recently, after five or six years. I have heard of but one or two such instances in the use of the osteoclast, and it is only a very remote danger.

The illustrations show the manner of using the osteoclast and some results obtained by its use, also the result in a sixteen-year-old girl following osteotomy recently performed at the Presbyterian Hospital.

CLINIC OF DR. A. J. OCHSNER

AUGUSTANA HOSPITAL

ENDOTHELIOMA OF THE BRAIN

Summary: Rapidly growing endothelioma of the brain accompanied by a feeling of numbness in right hand and convulsions. Operation—technic of craniotomy. Prognosis. After-history.

THE patient we have for operation this morning is a man twenty-seven years of age, who comes to us complaining of numbness in the right hand. He tells us that nine months ago he woke up one morning with a feeling of numbness in his right hand and arm. He was able to move them, but had no definite control. At the same time he had some twitching in the right side of the face and some thickness of speech. The twitching in the face disappeared after four or five minutes, the numbness in the arm and the thickness of speech in about four hours. The sensation in the hand never returned completely. At one-month intervals he has had similar attacks, except that the speech was not affected. One month ago he began having convulsions in the right arm and has had four in the last five weeks. They begin by twitching of the fingers of the right hand, which gradually extends to the hand and arm. As the convulsion progresses the arm is drawn up over the head. When the arm is fully drawn up over the head he loses consciousness. His wife says that he froths at the mouth and holds his breath, but that no other part of the body takes part in the twitching. His face, left arm, and leg are free and he never bites his tongue. He has had a peculiar taste, as of strong medicine, for the past few weeks, but there is no exacerbation of this before the attacks. The last attack occurred two days ago, while he was on the street. He felt it coming on and went into a store. He has been spitting



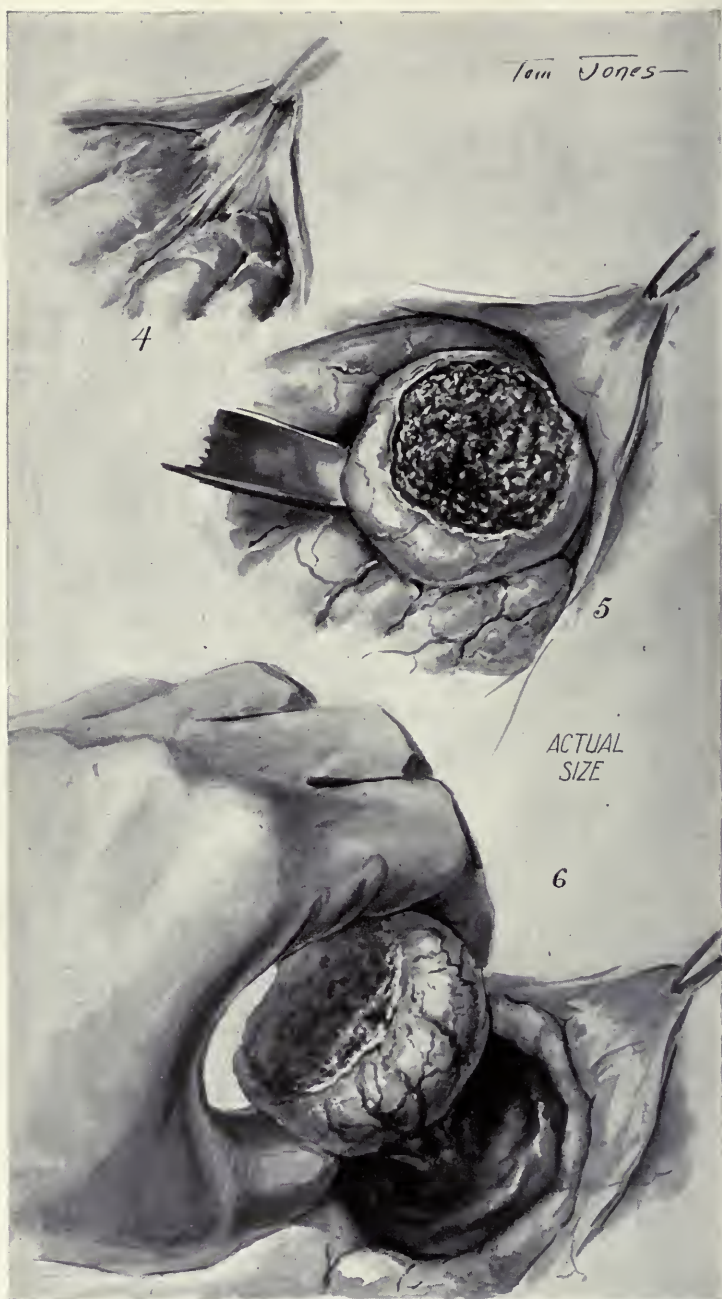
blood, which would seem to come from his nose or sinuses. His eyes have been blood-shot. In the beginning the attacks were only in the right arm; now they go up the right arm and down the back on the right side. He has had no headaches. All the functions are normal except that he says he cannot feel properly with the right hand. His past history is negative except for gonorrhea eight years' ago.

His general health is good. Examination of the head shows no change in contour and no localized tenderness; ears are negative; scleræ show innumerable subconjunctival hemorrhages. The pupils are equal and react to light and accommodation. There is slight horizontal nystagmus on both sides.

Neurologic examination is negative except for an adiadokokinesis in the right hand and an astereognosis in the right hand for small objects. Motor, sensory and cranial nerves, and co-ordination tests are negative. Ophthalmoscopic examination is negative, as is also the roentgenographic examination. His blood-pressure is 124 systolic and 80 diastolic. The Wassermann test is negative.

This case presents a definite condition. The lesion causing the convulsions and numbness in the right hand is, to all intents and purposes, an irritating one in the region of the left precentral convolution in the region of the arm center. As to its exact nature it is difficult to say before operation. The fact that it is of only nine months' duration would indicate that it is rapidly growing, though it might have been present for some time without causing any symptoms. The most common tumors which one would think of in this connection are endothelioma, glioma, tuberculoma, gumma, and cyst. The Wassermann reaction has been negative on three occasions, so that the probability of a luetic infection is practically ruled out. The patient would not consent to a spinal puncture. There is no evidence of tuberculosis elsewhere in the body, although this would not neces-

Fig. 239.—1, Incision for approach to fissure of Rolando. 2, Scalp retracted. Drill holes in skull preparatory to cutting osteoplastic flap. 3, Incision of dura between silk sutures and introduction of grooved director for cruciate incision.

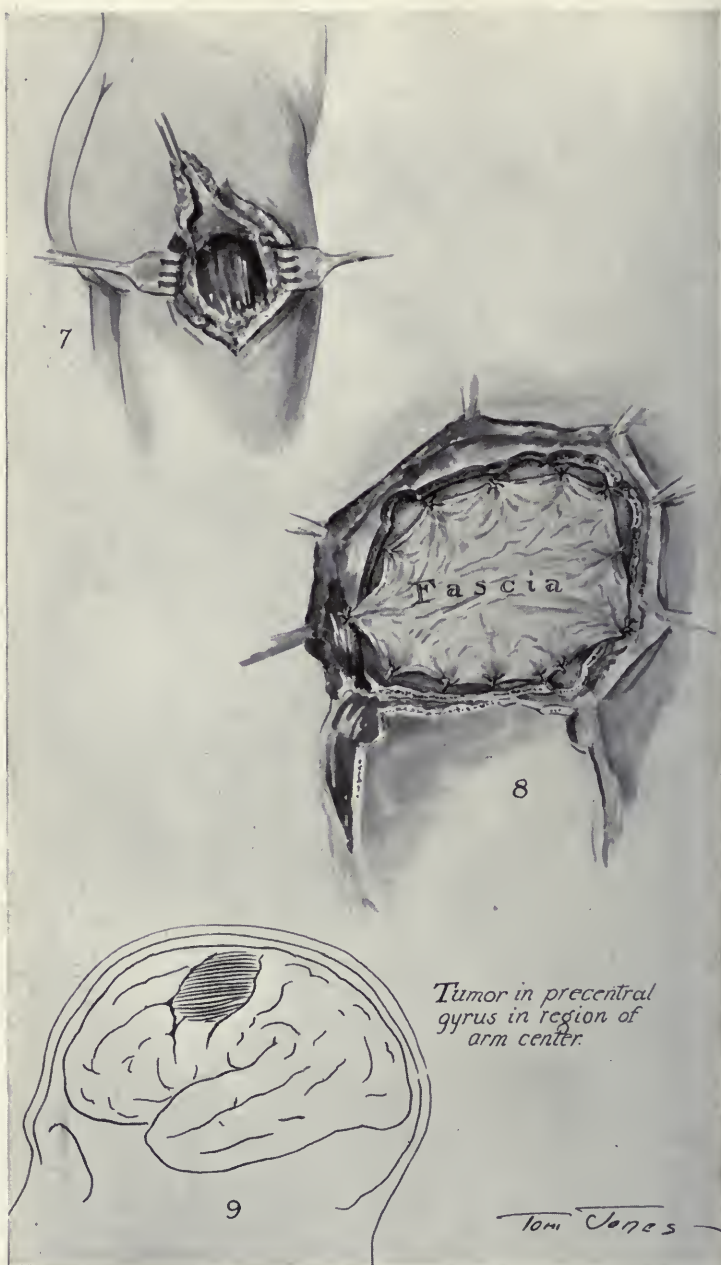


sarily rule out a tuberculoma of the brain. The most likely tumor is either an endothelioma or a glioma. Whether the adiadokokinesis and astereognosis are due to weakness of the right hand is problematic. This is an irritative lesion and not an obstructive one, as evidenced by the absence of paralysis of the right upper extremity.

The patient has been thoroughly prepared for operation. One hour ago he was given a hypodermic consisting of $\frac{1}{4}$ grain of morphin and $\frac{1}{100}$ grain of atropin. He was then thoroughly anesthetized in the dorsal position. On being brought into the operating room his head was elevated about 35 degrees. Attention is called to this form of anesthesia because many surgeons have devised intricate methods of administering anesthetics in brain operations. This patient after once being anesthetized will remain under the influence of the anesthetic for from three-quarters of an hour to an hour and a quarter, allowing sufficient time for the operation to be performed. The shock due to prolonged administration of anesthesia will thus be obviated and the risk greatly reduced.

The field of operation is prepared in our usual manner, cleansed with benzine, and painted with half-strength tincture of iodin. We will plan our incision so as to lay bare the fissure of Rolando. This fissure can be located in various definite ways. The one very often used is to take a midpoint between the glabella and the inion, go 1 inch behind that, and then drop a line $67\frac{1}{2}$ degrees from the middle (Fig. 239, 1). This will give us the usual course of the fissure of Rolando. We are going to make a bony flap so that the fissure of Rolando will be over the middle. We keep the anterior limb of our horseshoe incision within the hair line, so as to leave no scar visible when the hair grows again. We control the bleeding as we make the incision. With the aid of a Hogsund electric motor we are drilling a hole (Fig. 239, 2) at each limb of the horseshoe incision and two holes in the course of it; then with the electrically driven saw the bone is cut through and

Fig. 240.—4, Adhesion of dura over site of tumor. 5, Beginning of enucleation of tumor. 6, Tumor delivered, showing blood-vessels attached to its base.



the flap is broken off with the periosteal elevator. The dura has not been injured in this procedure, because it was separated from the bone before the saw was introduced. Now that the flap has been broken down care must be taken to preserve its warmth by wrapping it in a warm saline pack. This will also prevent the flap from becoming soiled by blood during our manipulations in removing the tumor. It is always essential to notice the condition of the dura. We note here that there is no pressure and no bulging. This was to be expected as a result of the ophthalmoscopic examination which showed no choking of the disks. By careful palpation oftentimes needless manipulation of the brain can be avoided and the lesion located. As we proceed to palpate the area of the tumor, coming over the region of the fissure of Rolando and following it carefully up and down, we find at about its middle an area about the size of a half-dollar which is firmer than the rest of the brain. This area corresponds to the location of the tumor. We shall now insert two silk sutures (Fig. 239, 3) through this area. Holding them taut, we incise the dura between and insert a grooved director very carefully so as not to injure any of the pial vessels. In brain surgery it is not only difficult but aggravating to have to deal with pial bleeding, as it is almost impossible to ligate these small vessels. Very often the bleeding can be controlled by a small piece of muscle. The dura is adherent over the site of the tumor (Fig. 240, 4). With the grooved director in place the dura is incised at each corner, making a cross-shaped incision. This anterior flap of the dura is elevated with difficulty. The dura is slowly peeled off, showing a gray area about 2 inches in diameter which is rather firm to palpation. We are inserting periosteal retractors at the sides and loosening the edge of the tumor (Fig. 240, 5). The tumor is now removed (Fig. 240, 6). There is some bleeding, which can be controlled by hot packs. The dura that was adherent to the tumor has been removed and we will now take a fascia flap from the right leg (Fig. 241, 7) and

Fig. 241.—7, Removal of flap of fascia and fat for transplant. 8, Transplant in place. Note attachment at two points to periosteum. 9, Location of tumor.

suture it with the fat side down over this area (Fig. 241, 8). The bony flap is now dropped back and sutured in place with interrupted silkworm-gut sutures. The patient is in good condition and his highest pulse during the operation was 148.



Fig. 242.—Photograph of specimen: A, Eroded area which presented.



Fig. 243.—Photograph of patient showing scar.

Because of the fact that this tumor was definitely encapsulated and completely shelled out, I believe that his chances for a complete recovery are very good.

After-history.—The day following operation the patient had a motor aphasia and paresis of the right arm and right side of the face. This aphasia and paresis gradually cleared up, so that three weeks after operation he was able to talk fairly well, has a fairly good grip in his hand, and was able to be up and around. Microscopic examination of the growth showed it to be an endothelial tumor.

CLINIC OF DR. GOLDER L. McWHORTER

PRESBYTERIAN HOSPITAL

ADVANTAGE OF THE ELEVATED DOUBLE INCLINED PLANE IN THE TREATMENT OF A FRACTURE OF THE LOWER THIRD OF THE FEMUR

Summary: Disadvantages of dependent double inclined plane. Relief through elevation. Treatment complicated by pleurisy. Application of cast. Final result successful.

THIS patient, whom we have shown several times before, was caught against a window frame and received a compound fracture of the left femur on November 6, 1919. He was brought directly to the hospital.

The patient is sixty-eight years of age. He has always been very active. Otherwise the history is negative.

On examination at that time there was a false point of motion about 4 inches above the knee-joint, considerable swelling and ecchymoses. Careful palpation and manipulation revealed crepitus at the above point. There was considerable mobility of the ends of the fragments, with no evidence of impaction.

A temporary Buck's extension was put on the leg below the knee, with a careful dressing of the wound in the soft parts. This wound was on the lateral aspect of the thigh and had probably been produced by the lower end of the upper fragment. This end could be palpated just beneath the skin, associated with considerable deformity. On measuring the legs the left was 3 inches shorter than the right. The points used for measurement were the anterior superior iliac spine and the medial malleolus of the tibia.

Roentgenograms were taken to determine the nature and type of fracture and the extent of the deformity. Examination

of these (Fig. 244) reveals a short, spiral, comminuted fracture of the upper part of the lower third of the femur in the supracondylar region. The comminution is only slight, but there is one large spicule of bone which is entirely separated. There is

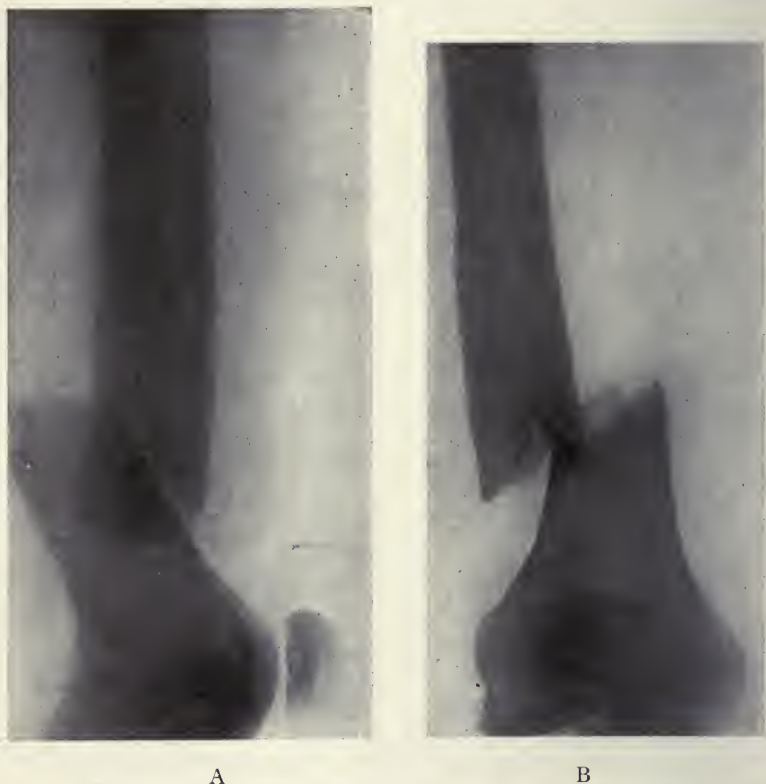


Fig. 244.—Roentgenograms taken one day after fracture. The original shortening of 3 inches has been largely overcome. There is quite marked posterior displacement of the upper end of the lower fragment and also lateral angulation of the axis of the lower fragment. The lower fragment is displaced medially. A, Lateral view; B, anteroposterior view.

backward displacement of the upper end of the lower fragment and also medial displacement with angulation. It is of great value in determining the deformity in fractures as seen on the roentgenograms to hold up a rule, a straight stick, or cardboard on edge in front of the picture. The ruler is placed in the line

of the axis of first one fragment and then the other. The angle of the deformity may then be measured. In many cases the actual deformity is not at first apparent, or there may be no angulation, where, due to the position of the surrounding parts, there appeared to be some. We must also consider lateral or anteroposterior displacement of the ends of the shaft, without perhaps any angulation whatever. Provided the ends are in contact at all without angulation we expect an excellent result in practically all cases where non-union does not result. Naturally, interposition of soft parts, infection, or other conditions may produce failure to unite.

Our main purpose here, then, was to get primary healing of the soft parts, to correct the angulation, and to get the ends of the fragments to unite in correct alignment or at least in contact, at the same time to prevent pulmonary complications by a back-rest and the avoidance of ether anesthesia.

In order to correct the deformity in the supracondylar region of the femur we have certain definite things to do. We cannot control the lower fragment directly, but by relaxing the gastrocnemius muscle which attaches posteriorly and at the upper part of the condyles of the femur, we keep from increasing the posterior displacement of the upper fragment which it has produced. Traction on the leg below the knee increases it and we, therefore, must relax the muscles by flexing the knee. We know the position of the upper fragment, consequently we must line up the lower so that its axis corresponds as nearly as possible to that of the upper fragment. The hamstring muscles also tend to increase the overriding, consequently, the thigh must be flexed. Another factor is to relax the remaining thigh muscles which tend to produce overriding. This may be done by extension by means of a weight and pulley applied on the lower fragment or any point distal to the fracture. After correction of any overriding fixed extension may be sufficient. Traction may be made upon the leg below the knee, but since the knee should be flexed, that is not desirable. Where possible, traction should be applied directly to the lower fragment. Ordinarily we can do it very nicely in a simple fracture by means of adhesive

and a bandage extending above the condyles of the femur. Here, the presence of a wound in the soft parts makes it difficult to apply.

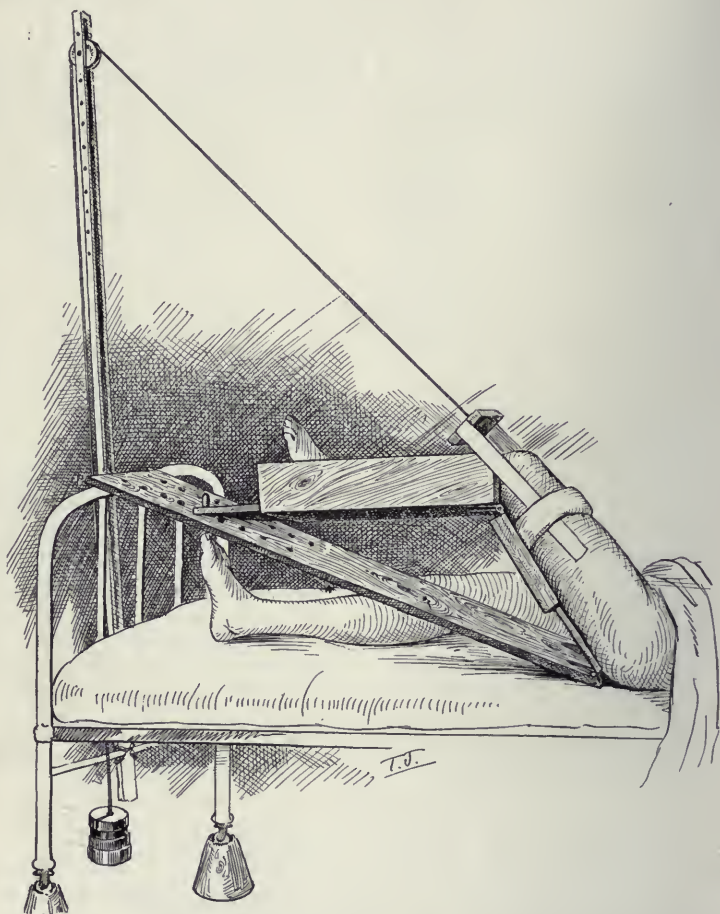


Fig. 245.—The distal plane of the double inclined plane is horizontal. The extension is from the condyles of the femur by means of adhesive straps and a bandage above the condyles. The leg may be raised or lowered by passive motion.

By first applying sterile gauze to the wound and then placing the adhesive along the thigh and bandaging over it, I accomplished traction from the condyles. It was necessary to dress

this wound every day or two at first, but it healed completely in a week. The leg and thigh were placed upon a double inclined plane. This permitted flexion of the thigh and knee. A 16-pound traction weight was applied to a cord running over a pulley and attached to a spreading board between the ends of the adhesive straps below the knee. This traction was made in the line of the axis of the upper fragment. The double inclined plane is made, as you see, so that the knee may be flexed more or less and the thigh raised or lowered. The two planes are each made of two sliding boards so that they may be shortened or lengthened, depending upon the size of the patient. The patient was given a back-rest during the day, since pulmonary complications are very common in these cases. A recumbent position and also fat emboli undoubtedly play a large rôle in the development of pneumonia.

Two or three days after the leg was put up in the double inclined plane the leg began to swell quite a good deal below the knee. In order to improve the circulation I elevated the distal end of the double inclined planes so that the lower plane was horizontal. The line of traction was changed to remain in line with the upper fragment of the femur and the splint fitted to the thigh (Fig. 245). The following day the edema had entirely subsided. This position is a great improvement over the former position with the leg dependent, and it also flexes the thigh more.

The evening of November 24th the patient complained of pain in the left axillary region. Examination revealed no definite findings. The following morning this pain was much worse, especially on respiration. The respiration was increased somewhat and he had about 1 degree of fever. On examination at this time there was slight dulness over the base of the left lung posteriorly, a few râles, and increased breath sounds. There was marked pain on respiration and evidence of a pleuritis. This was nineteen days after the fracture, and there was still marked motion at the site of fracture.

It seemed best to get him out of bed in a wheel chair. Consequently, I put on a plaster cast from the thigh to the toes, leaving the weight and extension attached during its application.

I next strapped the left side of his chest with adhesive and got the patient into a wheel chair. The next day he was better, respirations practically normal, and no dulness could be found, although breath sounds were not normal. Roentgenograms taken at this time showed considerable callus present (Fig. 246).



Fig. 246.—Twenty-three days after fracture. There is evidence of a good callus extending up along the shaft from the end of the lower fragment. The other view is not shown, but the alignment in both planes is much improved by use of the double inclined plane splint (Fig. 245) with extension.



Fig. 247.—This view, taken fifty-three days after fracture, shows a very well-developed callus. Compare the alignment of the fragments with those in Fig. 244. Patient started to walk in a cast.

No further trouble was evidenced. The patient was up and around in a wheel chair until eight weeks after the fracture, when I removed the cast. A third roentgenogram (Fig. 247)

was taken and evidenced good callus. There was very firm union and abundant callus on examination of the femur. A plaster cast was then put on from the thigh to the ankle and the patient was permitted to walk with crutches. In ten days he was walking upon the leg with only the aid of a cane. This



Fig. 248.—Roentgenograms taken one hundred and ten days after fracture. There is a dense callus, especially from the upper end of the lower fragment. The appearance of overriding is due to the callus. Shortening is only $\frac{5}{8}$ inch, probably the length of the spiral, as the ends appear to be only in slight contact. A, Lateral view; B, anteroposterior view.

cast was removed five weeks later, or thirteen weeks after the fracture, and you see he walks very well without the cane. These last roentgenograms have just been taken, and we see a very good callus (Fig. 248). The presence of such a dense and

large amount of callus uniting the ends of the fragments which are only partially in contact, at first makes it appear as though there is considerable overriding. There is some limitation of motion at the knee-joint, although when the extension was removed the knee was freely movable. This is partly due to attachment of the callus to the quadriceps, partly due to the long immobilization of the knee and lack of full use of the muscles during this time. He has an excellent result, and in a short time will have practically complete functional use of the leg.

Experience during the war has improved the treatment of fractures of the femur to a great extent. This applies particularly to compound fractures that require dressing, but a similar treatment may be advantageous in simple fractures. In this instance we got the case early and were able to overcome the overriding very promptly. I preferred to use adhesive straps, but would not have hesitated to apply skeletal traction by means of the calipers at any time. Where the muscles have contracted for several days it is necessary in most cases to relax them under an anesthetic and use fixed extension, or, preferably, apply the so-called skeletal extension.

The value of the Thomas splint was proved early in the war and it became the routine transport splint in most cases (Rankin, Driberg). Fixed extension was used in most of these cases by means of adhesive straps, bandages applied with glue or some similar preparation, and attached to the foot of the Thomas splint. Many modifications were adopted, but the principle of the Thomas splint always stood the test.

Following its use in transport there developed a tendency to continue the splint during the course of union. This was stimulated because of the ease with which the extremity could be dressed, since most of the fractures were compound and badly infected.

Blake suggested the suspension of these fractures in order to facilitate dressing the wounds and to improve the circulation. This permitted the man to sit up and to move about the bed easily. In 1917 he stated that 94 per cent. of deaths following wounds of the thigh at the American Ambulance had pulmonary

complications sufficient to cause death. He thought that this was due largely to the recumbency. He developed a splint somewhat similar to the Thomas splint combined with suspension from an overhead frame or superstructure and gave the patients a back-rest, with improvement in results.

Since many fractures had marked overriding because of lack of early attention and proper application of fixed extension, it was found advisable to apply more accurate traction to the bones themselves. This was done by the application of some apparatus distally to the fracture. Among the types of apparatus may be mentioned the transfixion pin of Hey Groves or Steinmann and the calipers to the femur, tibia or ankle, tibial screws, and Schutro's stirrup. The transfixion of the condyles of the femur by a pin was not particularly satisfactory. Consequently, Besley introduced the use of the calipers previously used by Ransohoff.

Their use in reducing overriding and controlling the lower fragment combined with suspension on a Thomas splint or a modified splint was promptly adopted.

Glaspel describes the end-results in a series of 50 cases of compound fractures of the femur. Some infection occurred at the site of the calipers in 18 per cent., but he thinks this could have been prevented in most cases. Bulkley and Sinclair, however, removed them in 29 per cent. of their cases on account of local infection. Glaspel mentions 2 cases of non-union without much infection and with good position of the ends. On roentgenographic examination no sequestra or foreign bodies were seen. The consensus of opinion is, however, that the fractures heal as well or even more quickly when treated by calipers. Where the Thomas splint was used with adhesive strapping the splint was bent at the knee to an angle of 15 degrees, in order to relax the gastrocnemius muscle. Where the calipers were used the "knee flexion splint" introduced by Pearson gave excellent results. This splint is the lower $2\frac{1}{2}$ feet of a Thomas splint cut off and attached to a straight Thomas splint at the knee. This permits the leg to hang at any angle over this attached splint, which may be raised or lowered at will. Ex-

tension is applied to the end of the straight splint. Other methods were of advantage in particular cases or were entirely discarded for the Thomas splint. The transfixion pin is a long pin which penetrates the entire bone. This was practically discarded for the calipers in the femur, but worked well where tibial traction was indicated (Bulkley and Sinclair). Tibial screws are two screws, 2 inches long, screwed $1\frac{1}{2}$ inches into the tibia about 6 inches below the knee. When extension is applied from these they frequently become loose. Schutro's stirrup is a short steel rod inserted between the tendo achillis and the bone and rests against the os calcis. Traction is applied from the ends. Occasionally the tendon was cut and, consequently, its use was largely stopped. Cannaday recommended wiring oblique fractures of the femur where there was little or no comminution. With more comminution skeletal traction with suspension was used. Hey Groves objected to wiring many of these cases, as he stated it was unnecessary. Certainly in many cases open operation for the fracture of the femur is necessary, but if treated conservatively following the fundamental surgical and anatomic principles, and controlling them with frequent roentgenograms, a very good result will be obtained no matter what type of apparatus is used.

BIBLIOGRAPHY

- Besley: Value of the Caliper in Obtaining Extension in Compound Fractures of the Femur, *Jour. Amer. Med. Assoc.*, 70, 87, 1918.
- Blake: Suspension with Extension in the Treatment of Fractures of the Limbs, *Amer. Jour. Orthop. Surg.*, 15, 644, 1917.
- Bulkley and Sinclair: Fracture of the Femur, *Ann. Surg.*, 69, 466, 1919.
- Cannaday: Caliper Extension in the Treatment of Fractures of the Femur, *Jour. Amer. Med. Assoc.*, 73, 1281, 1919.
- Driberg: Fractures of the Femur, *Lancet*, ii, 311, 1919.
- Glaspel: End-results from Treatment of Compound Fractures of the Femur by the Caliper Method, *Jour. Amer. Med. Assoc.*, 71, 649, 1918.
- Rankin: A Note on the Thomas Splint for Fractures of the Femur, *Brit. Med. Jour.*, 2, 248, 1917.

CLINIC OF DR. ALLEN B. KANAVEL

WESLEY MEMORIAL HOSPITAL

TUMORS OF THE FACE

Summary: Demonstration of patients and discussion of clinical varieties, etiology, and surgical pathology of tumors of the face. Technic of the operative removal of a mixed tumor of the parotid.

I WISH to discuss with you this morning the subject of tumors of the face and jaw, particularly as illustrated by 3 patients, upon one of whom we shall operate at the close of the hour.

CASE I.—The history of this patient, in brief, is as follows: He is twenty-eight years of age, is a chauffeur, and was admitted to the hospital December 9th, complaining of a swelling of the right side of the face in the region of the parotid gland, and of a smaller growth just below the angle of the jaw on the same side. The mass in the region of the parotid is painful, but not tender; the pain radiates into the right superior alveolar process and becomes very severe at times. The second mass is not painful. The first symptoms appeared in June, 1918, when the patient noticed a small bean-sized swelling below the angle of the jaw on the right side; six weeks later a swelling was noticed over the right side of the face, which gradually increased in size, until at present it is about as large as an orange. The mass beneath the angle of the jaw has also slowly increased in size. In September, 1918 the patient received fifteen x-ray treatments, causing the lower tumor to diminish in size; the mass in the parotid region, however, has gradually become larger. He has some difficulty in mastication; his jaws open only about 1 inch. He has no difficulty in swallowing or in breathing. He has lost 15 pounds in weight in the past six months.

Eighteen months ago the upper right third molar was extracted because of persistent pain in this tooth. * The extraction

required two hours because of its difficulty, but recovery was uneventful, and the patient has not experienced any pain in this region since.

There is no history of injury, or of infection of the ears, nose, or sinuses. At eight years of age he had a suppurative infection of the glands of the neck. There is no history of venereal disease.

The family history is negative.



Fig. 249.—Photograph of Case I before operation.

Physical examination shows a well-defined tumor mass in the region of the right parotid gland about the size of a half orange (Fig. 249); the mass is smooth, firm, and fixed; it is not adherent to the skin. Immediately below the angle of the jaw on the same side is a second enlargement about the size of an egg, rather deeply placed, which seems to extend upward behind the angle of the jaw. It has the same physical characteristics

as the other mass, but is apparently not continuous with it. Physical examination otherwise shows no abnormalities.

Examination of the blood shows 6,048,000 red cells; 10,100 white cells, with 17 per cent. of lymphocytes, 13 per cent. of large mononuclear cells, 67 per cent. of polymorphonuclear cells, and 3 per cent. of eosinophils. Estimation of the hemoglobin by Dare's method shows 80 per cent. The Wassermann test and the urine examination are negative. The patient's temperature is 98° F., his pulse 60, and respirations 24.



Fig. 250.—Photographs of Case II before and after operation.

CASE II.—This patient, a young woman twenty-eight years of age, complains of a swelling of the lower lip which has been present since childhood. The patient states that the swelling varies in size; that periodically the lip enlarges, becomes painful, and that a discharge appears from a small sinus in the lip about $\frac{1}{2}$ inch below the mucocutaneous junction in the midline. Following the appearance of the discharge the swelling disappears, to recur again in from ten days to two weeks.

Examination shows a soft diffuse enlargement of the lower

lip, most marked near the midline (Fig. 250). There is a small sinus on the inner side of the lip, discharging into the mouth. There are no enlarged submental or submaxillary lymph-glands.

CASE III.—This child is six years of age. Her mother says that for the past seven months she has had this swelling of the lower lip, which is painless, not tender, and about the size of a pecan. The mother thinks that it has grown very slowly. The



Fig. 251.—Photographs of Case III before operation.

mass is soft and fluctuating, it is symmetric in outline, with its largest diameter in the midline (Fig. 251).

A number of photographs and lantern slides will now be presented showing examples of other tumors of the face.

To understand the development of tumors in the face, why they occupy certain positions, and whether they originate from the bone or the soft tissues, we must recall to mind the embryologic development of the face. You will remember the stomatodeal space is bounded anteriorly (above) by the frontonasal process, and that upon this, on either side of the median line,

are situated the shallow olfactory pits, dividing it into the median nasal process, and the two lateral nasal processes (Fig. 252, A). Laterally the space is bounded by the maxillary processes, and posteriorly (below) by the mandibular bars. As fetal growth progresses, the fissure between the maxillary process and the lateral nasal process closes; the maxillary process, carrying with it the lateral nasal process, fuses with the median nasal process to form the nose and upper lip. The fissure between the maxillary process and mandibular arch partially closes on either side. The mandibular arch has already been formed by the fusion of the mandibular bars. If these various fissures fail to close we have the anomalies of fetal development associated with hare-lip and cleft palate. If fusion between the maxillary process and mandibular arch does not take place we have too large a mouth; if it occurs to an abnormal degree we have a small mouth. It is not our purpose to discuss these conditions today, but simply to call attention to the fact that such congenital anomalies are associated with some abnormality of closure.

During the process of fusion just referred to epiblastic tissue is frequently "turned in," to result at a later period in the development of tumors. You have seen three pictures showing dermoid tumors, one situated at the outer angle of the eye, another above the eyebrow, and the third between the nose and the superior maxilla. Such tumors are all due to the infolding of epiblastic tissue. When they occur about the eyebrow, the site of the former nasolacrimal sulcus, they may impinge directly on the dura. It is not uncommon to find these tumors with small tubular projections running down to the dura, even though there is an almost complete obliteration of the frontomaxillary suture.

It is not common for dermoid tumors to lie at the line of union of the maxillary and mandibular processes. We very commonly, however, have a dimple at these sites which is merely an evidence of the original location of the fissure. The junction of the mandibular bars is not commonly the site of dermoid tumors, but they may occur at this point.

You can readily understand that where there is an inclusion

of epiblastic tissue, malignant degeneration is not uncommon. One often sees carcinoma at the nasolateral fold, at the inner and outer canthus of the eye, or on the side of the lip near the angle of the mouth. Again, you will remember these are the lines of fetal closure (Fig. 252, *B*). You have seen individuals with double-tipped noses, perhaps with a few hairs growing out at

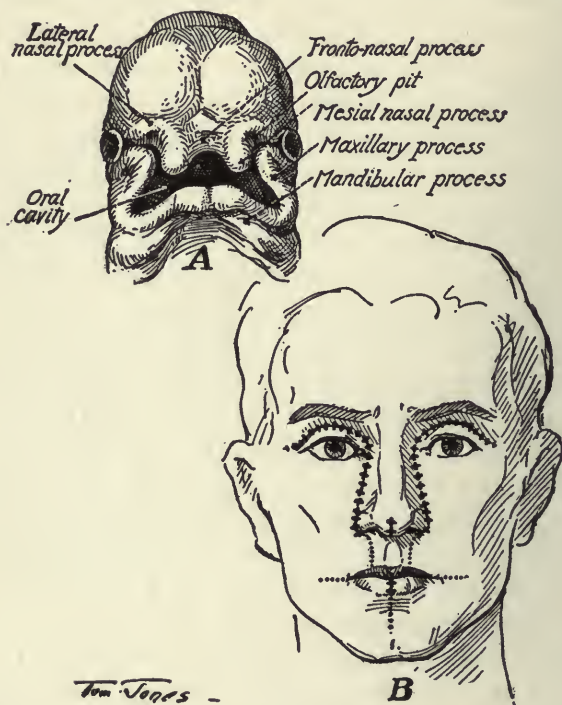


Fig. 252.—*A*, Head of embryo at about four weeks, showing lines of fetal closure. (After His.) *B*, Lines along which congenital tumors of the face make their appearance.

the tip of the nose; they indicate the presence of small dermoid cysts, resulting from the inclusion of epiblastic tissue, which may undergo secondary malignant degeneration.

We may have cystic tumors of the face resulting either from embryonal inclusions or from occlusion and overdistention of normal glands. The cyst of the lower lip in the third patient

shown you was the result of an embryonal inclusion in fetal closure. Such cysts may also occur about the ear, particularly upon the tragus, due to fetal inclusions during the closure of the first branchial cleft. They may be of fair size and somewhat movable. If the cleft fails to close completely there is a branchial sinus instead of a cyst.

The second case illustrates the formation of cysts due to the overdistention of normal glands. In this patient the appearance of the tumor is not dissimilar from that of lymphangioma, which also has a predilection for the lips. The periodical swelling of the lip, however, followed by the opening of the sinus, and the discharge of mucoid material seems to differentiate this growth. As is shown by this case, cysts which develop from the labial mucous glands are generally multiple.

The occlusion of the ducts of sebaceous glands, with the formation of sebaceous cysts, needs only to be mentioned.

We may have tumors of the face due to the overdevelopment of tissue normally present, such as hemangioma and lymphangioma, which occasionally occur about the angle of the mouth and upon the lips. Lymphangiomas particularly develop about the lips causing a soft, compressible thickening which is not fibrous in nature, but due to an overdevelopment of the lymph-vessels of the skin.

Of the tumors of the jaw which appear as a result of abnormal development of the fetus the most common is the odontoma. You will remember I showed you a number of photographs of patients with this type of tumor. I drew your attention to the fact that the tooth (using a lower tooth as an illustration) is formed by a projection downward of the surface epithelium, the dental lamina (Fig. 253, 1-3 *d. l.*), into the mandibular process, and the growth upward of the cellular connective tissue of the jaw. On the under surface of the dental lamina appears a number of knob-like projections, the adamant organs (Fig. 253, 1-3, *e. g.*), corresponding to the number of milk teeth, each of which becomes bell shaped, due to the invagination of its lower surface. At the same time the cellular connective tissue of the jaws grows upward into this concavity as the *papilla dentis*

(Fig. 253, 3-5, *p*). The two layers of cells thus brought together, the upper lining the concavity of the adamant organ, and the lower covering the *papilla dentis*, are called respectively the adamant

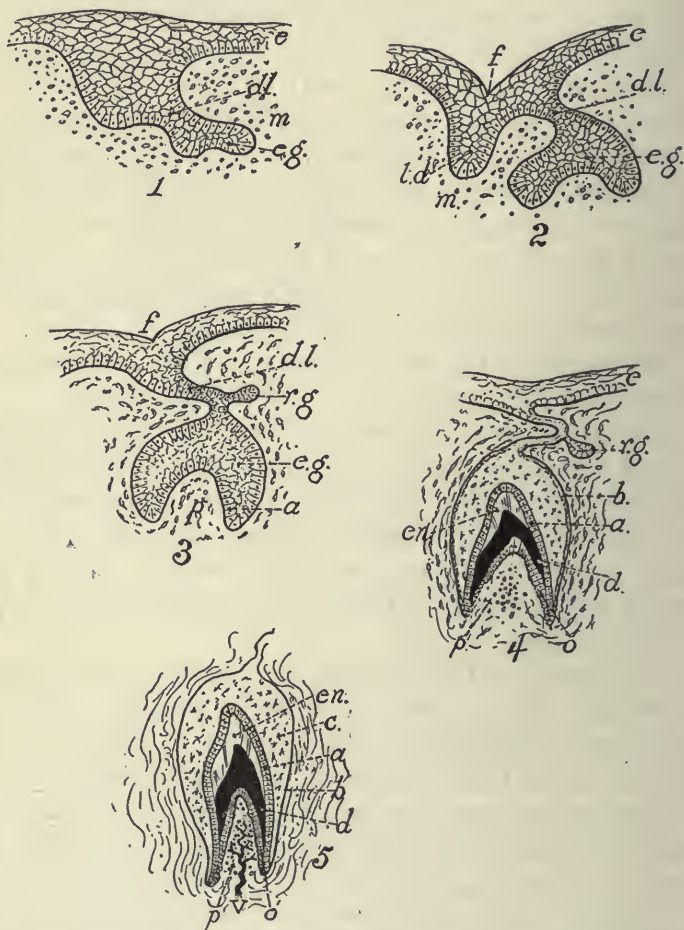


Fig. 253.—Illustrating the development of a tooth. (After Cunningham.)

cells or ameloblasts, and the odontoblasts; and form the enamel and ivory of the developing tooth.

The connective tissue of the gum surrounding the tooth germ, the developing tooth with its adamant organ and dental papilla,

becomes condensed and vascular to form a membranous layer, the tooth sac (Fig. 253, 4, 5, *b*), which shuts off the developing tooth from the surrounding structures. The tooth germ rests on the floor of this sac, and the young tooth is enclosed by it as a kernel by its shell.

During this process certain groups of epithelial cells may remain in the embryonic jaw as "epithelial rests." According to Malassez they come from (1) the mucous membrane of the fetal jaw; (2) from the outer epithelial membrane of the adamant organ; or, most commonly, (3) from the epithelial cord between the mucous membrane and the adamant organ (Fig. 253, 3, 4, *r. g*). It is probable that the cells of this cord, having served their usefulness, become detached from the adamant organ (or enamel organ) and may later give rise to tumors which are variously known by the name of epithelial odontoma, adamantinoma, adenocarcinoma of the jaw, etc.

These tumors appear in young adults, most frequently near the angle of the lower jaw. They may start near the alveolar border, and project from it, or they may start within the body of the jaw and cause a diffuse enlargement, extending in some cases from the angle to the symphysis. They may become as large as an orange or grape-fruit, in extreme cases still larger. If they develop in the upper jaw they may entirely fill the maxillary sinus before any symptoms appear. The rate of growth is usually slow; the symptoms depend chiefly on involvement of the nerve trunks and the presence of infection. The tumor itself is hard and fixed; it is intimately connected with the jaw; its surface may be irregular, due to the inclusion of both cystic and solid elements. There is no enlargement of adjacent lymph-glands unless infection is present.

A second form of tumor, cystic in type, arises from the overgrowth of some part of the follicle or tooth sac mentioned above. Depending on the stage at which the cyst develops there may be present within it any part or the whole of a tooth, or even of several teeth. Such cysts, known as dentigerous cysts, may develop in either jaw, usually upon the outer side of the alveolus. They appear during adolescence or young adult life, more

commonly at the site of the wisdom teeth. They grow slowly, developing with the new growth of bone in the cyst wall; but they may attain an enormous size. They are usually painless unless directly involving the inferior or superior dental nerve. They frequently crackle on pressure, due to the thinness of the

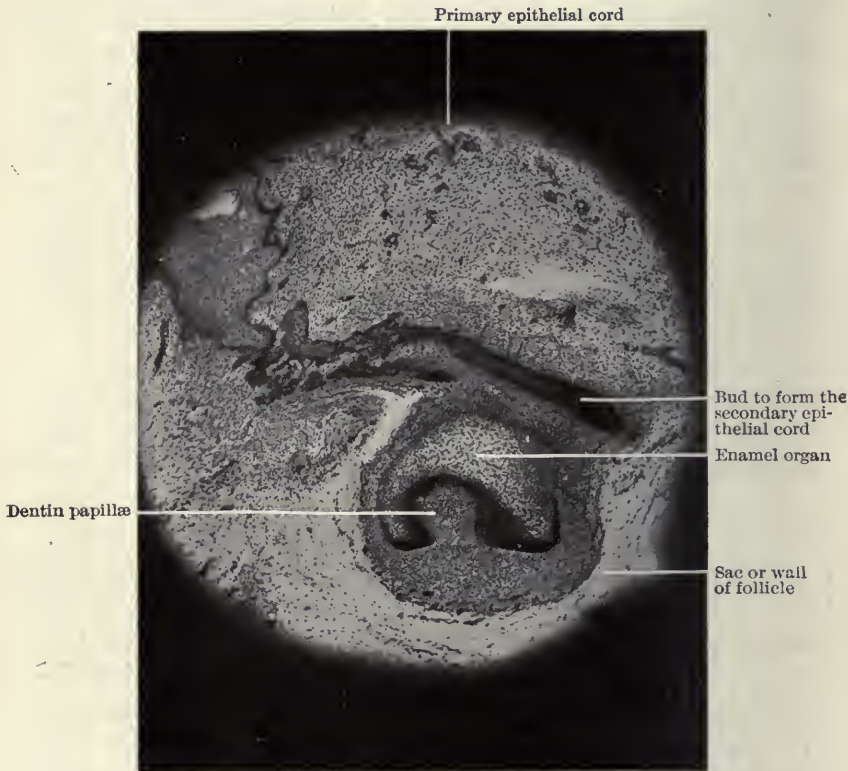


Fig. 254.—Development of a tooth, ninth week, showing remains of the epithelial cord, and the developing tooth sac. (Marshall's Operative Dentistry.)

overlying bone. Aspiration of the cyst contents and *x*-ray examination are valuable in establishing a diagnosis.

Root cysts, the most common form of cysts, originate from the cystic degeneration of the granulation tissue attached to an infected or irritated tooth root. They occur chiefly in connection

with the incisors and bicuspid of the upper jaw. Malassez considers them as remains of the epithelial sheath of the adamant (enamel) organ.

They usually develop without symptoms and are first noticed as a bulging of the wall of the maxillary sinus, or of the hard palate. They ordinarily are the size of a walnut, but may grow much larger. Not infrequently they become infected from a neighboring carious tooth, and are then filled with foul-smelling pus. Exploratory puncture and x-ray examination will help to establish a diagnosis. The location and the absence of unerupted teeth or fragments of teeth within the cyst differentiate them from dentigerous cysts.

Of the tumors that occur without a definite relation to embryologic development the most common is sarcoma of the jaw. Those developing from the bone-marrow are commonly benign, giant-celled tumors. The malignant round-celled or spindle-celled variety occurs less frequently. Mixed tumors, fibrosarcoma, chondrosarcoma, osteochondrosarcoma, or lymphangiosarcoma are not uncommon.

Our ideas as to the malignancy of giant-celled sarcomas have undergone a marked change. Years ago we considered them very malignant. Now we know that if a giant-celled sarcoma is completely removed it does not recur. Complete resection of the jaw, therefore, for giant-celled sarcoma should not be advised unless there is so great a destruction of the jaw as to impair its action. Of the tumors arising from the periosteum of the bone the spindle-celled is more common than the giant-celled sarcoma. It grows rapidly, and tends to recur more rapidly after removal. If it is excessively vascular it seems to recur more quickly. It may sometimes be distinguished on x-ray examination by the dense shadow cast by reason of its great vascularity, and by the fan-shaped structure of the bone at the periphery of the growth, similar to that seen in sarcoma of the long bones.

If a tumor develops from the bone, involvement of the nerve, resulting in severe pain, is not uncommon. I wish to emphasize the importance of pain as an early symptom of tumors originating in the bone. The patient frequently tells you he went first to a

dentist who removed one or two teeth because of the pain, only to find a number of months later that the pain was due to the tumor. The first patient complained of pain eighteen months before he came to us. Since the tumor involved the upper jaw the pain might have been due to pressure upon a nerve from a tumor mass arising from the bone. Examination of the *x*-ray picture, however, shows that the tumor mass does not involve the maxilla. Furthermore, since the pain ceased after the removal of a single tooth, it seems unlikely that in this case it could have been due to pressure of a tumor upon a nerve.

In addition to sarcoma, carcinoma may develop in either jaw. It frequently has its origin in some long-continued traumatism, or in an infection about the teeth that gives rise to a chronic inflammation. When it occurs it usually grows rapidly, with a granulating or a fungoid surface appearing at the junction of the mucous membrane with the tooth.

There is no site of predilection for sarcoma or carcinoma. Growths involving the antrum are more likely to be sarcomatous than carcinomatous. If a sarcoma involves the antrum it may give rise to pigmentation of the face, nosebleed, double vision, infra-orbital neuralgia, and closure of the nasal passages. An empyema of the antrum that does not clear up rapidly after puncture should suggest the possibility of sarcoma. This patient had no pigmentation on the face and there are no other symptoms of antrum involvement. The *x*-ray shows the antrum clear, so we may assume it has not been involved.

The benign tumors which involve the jaw are osteoma, lipoma, fibroma, myxoma, chondroma, or a combination of these. Osteoma, when it grows from the bone itself, projects outward, grows slowly, is very hard and painless. An osteoma, however, which grows within the antrum, the frontal or ethmoid sinus may grow very rapidly, erode the orbital plate, and cause pressure on the eye. It is difficult to differentiate between an osteoma growing from the orbit and pressing the eye outward, and some other type of tumor, such as a sarcoma or even an abscess developing from the ethmoid. The *x*-ray picture should show in the case of an osteoma a heavy, dense shadow. Osteoma

of the antrum also occurs, but probably not as frequently as osteoma developing from the frontal sinuses.

Fibroma is uncommon. It occurs, however, developing from the fibrous connective tissue between the skin and the bone, and is attached to the superior or inferior maxilla. It is slow growing, painless, and smooth; it may throw a faint shadow on *x*-ray examination.

Another type of fibroma is due to the development of tissue along the line of fetal closure of the mandibular bars. Occasionally there is a thin line of fibrous tissue, 0.5 cm. in width, in which there are a considerable number of sebaceous glands, the nidus consisting of fibrous and glandular tissue. It is not common, but it does occur.

Lipoma is extremely uncommon. It may occur on the face below the eye and on the side of the nose.

An extremely uncommon type of tumor that should be mentioned is the so-called "horn" appearing on the forehead, due to the overdevelopment of sebaceous material. It is not the hard horn that we find in cattle, but a keratosis.

A somewhat different type of tumor is that rather commonly involving the salivary glands, particularly the parotid and submaxillary glands. This type belongs to a class known as mixed or complex tumors, new growths containing a considerable variety of tissues generally considered of mesoblastic origin, such as cartilage, myxomatous tissue, fat, and lymphoid structures, and, in addition, cells resembling epithelial, endothelial, or connective-tissue cells, and consequently known as epithelial, endothelial, or sarcomatous growths. These cells, which may be designated as parenchymal to distinguish them from the stroma, give to salivary gland tumors their peculiar morphology.

Mixed tumors occur most commonly between the ages of fifteen and thirty. They are of slow growth and well encapsulated. Due to their mixed character they are frequently hard and nodular in certain parts and soft in others. They usually lie superficial to the important vessels and nerves. They show a distinct tendency to undergo malignant degeneration; probably 10 per cent. of them become sarcomatous.

Among the other benign tumors of the parotid we may have fibroma, myxoma, chondroma, adenoma, and rhabdomyoma; but they are not so common as the complex or mixed type, the fibromyxochondroma. Lymphangioma and angioma are rare; lipoma and fibroma are uncommon. Cystic tumors, due to the obstruction of one of the ducts of the salivary glands, are found occasionally, most commonly in connection with the sublingual or submaxillary glands.

The malignant tumors of the parotid are sarcoma and carcinoma. They may assume any of the various characteristic cellular types of these tumors. Sarcoma is commonly of the mixed type, as the chondro-, adeno-, or endotheliosarcoma. Carcinoma may be scirrhous or of the rapidly growing cellular type.

Tumors due to infections may be briefly mentioned. Actinomycosis begins in the lower jaw and is characterized by the breaking down of the tissues with the discharge of the characteristic granules. Syphilis and tuberculosis of the face, or lupus, give a definite and characteristic picture. Tumors due to acute infections are usually diagnosed without difficulty from the history and the acute character of the symptoms.

We have spoken briefly of the prognosis in these cases. The giant-celled sarcoma particularly is benign if removed early. The spindle-celled and round-celled varieties may be removed successfully. A few patients have remained well for a number of years following the removal of such tumors, and a few have remained well permanently. If the tumor is removed at the stage where the entire mass can be excised I think it is possible to obtain complete recovery. Unfortunately, many of these patients report to us a year or two years after the beginning of the growth, when it is impossible to remove it. In these cases secondary masses, such as one would not ordinarily expect from sarcoma, develop in the neck. From a therapeutic standpoint, therefore, in cases with sarcoma of the jaw, it is advisable to remove carefully the glandular tissue of the neck and to carry out a thorough course of radium treatment after operation.

In this particular patient there is a question whether the

mass in the jaw is a secondary growth or whether the tumor of the face is secondary to a primary mass in the jaw. In either case, it is necessary to remove all the gland-bearing tissues of the neck.

In operating upon these cases one should always resect more widely than he believes the tumor to extend. In other words, if the tumor has grown down to the bone it is wise to remove a section of the bone, and, in aggravated cases, the entire maxilla involved, so as to go well beyond any possible tumor growth. Where possible the upper table of the superior maxilla should be preserved to prevent prolapse of the eye. The mortality following operation is much less than one would expect. With primary ligation of the external carotid, and with a carefully administered anesthetic through a tube, these patients, in a large percentage of the cases, make a satisfactory recovery after operation. Operation should be performed in all cases in which there is any possibility of removal of the growth. We will now proceed with the operation upon the first patient shown you.

An incision is made in the neck parallel to the anterior border of the sternocleidomastoid. The glands along the jugular vein are carefully dissected out. The small branches of the jugular are ligated, and the mass behind the angle of the jaw, which seems to be a part of the parotid, is removed. The mass is firm, of a yellowish-white color; it is adherent to the jugular vein and deeply placed above the digastric and stylohyoid muscles.

The second tumor mass, which is about as large as an orange, has a thick fibrous capsule and lies in the position of the parotid. The original incision is extended upward anterior to the ear, and a transverse incision made parallel with the lower angle of the jaw. The facial vessels are ligated; the facial nerve is exposed for some distance superficial to the mass. The fibers of the masseter are separated longitudinally, and higher up the posterior fibers are divided transversely. A well-defined mass lies directly on the surface of the mandible; it seems to have a pedicled attachment arising deeply from the temporomaxillary fossa, in

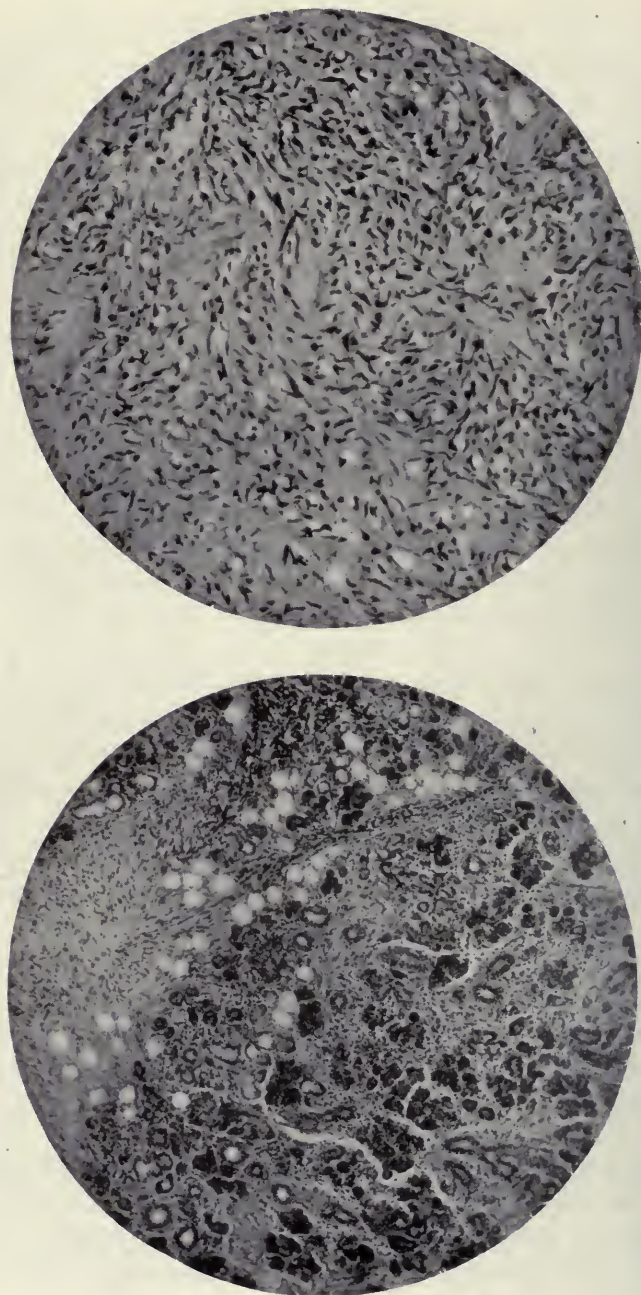


Fig. 255.—Section of tumor in Case I. A, Tumor cells invading parotid tissue (70 diameters). B, Typical arrangement of tumor cells (130 diameters).

front of the ascending ramus of the mandible. The mass is not adherent to the masseter or to the bone underneath. It is removed by blunt dissection from the surface of the bone, and



Fig. 256.—Technic of operation in Case II.

separated from its deep attachment. The external carotid is ligated above the origin of the superior thyroid. The bleeding vessels are ligated and the skin closed with silkworm sutures and clips.

Note.—Microscopic examination of both tumor masses showed a typical spindle-celled sarcoma (Fig. 255, A, B).

At the time of reading this proof, four months after operation, the patient presents a definite recurrence of the growth. This is being treated by radium applications, and the tumor mass which slowly developed during three months after operation is gradually becoming smaller. We believe that radium is much more effective than the x -ray in cases of this type.

Subsequently the second and third cases were operated upon, the latter by a submucous resection of the cystic tumor, and the former by carefully dissecting out the discharging sinus, and then, after lifting up the mucous membrane of the lip over a considerable area, removing one by one a large number of small cystic mucous glands. The technic of the operation and the appearance of the lip before and after operation are shown in Figs. 250 and 256.

CLINIC OF DR. HUGH McKENNA

ST. JOSEPH'S HOSPITAL

ARTHROPLASTY ON THE HIP

Summary: Ankylosis of the hip following neisserian infection. Arthroplasty—early operation justifiable in cases of present type—technic—the pedicled flap—postoperative dressing.

THE patient we have for operation this morning is a young woman twenty-eight years of age, with a history of a neisserian infection of a number of years' standing. The first symptom of hip disease came in the form of pain two years ago. The patient was treated for rheumatism without relief of the pain, until finally she became so crippled that it was necessary to send her to the hospital, which was done in the early part of this last summer. The patient was first seen by me June 7, 1919. After a careful examination Dr. George F. Dick was called in consultation and asked to work out the bacteriologic phase of the disease, which he did, isolating the neisserian organism from the vaginal discharge. After several x-ray pictures were taken a Buck extension and a plaster cast were applied to the right hip and leg. Owing to a beginning involvement of the left hip a Buck extension was also applied to this leg. Owing to the amount of pain suffered by the patient in the right hip-joint the question of surgical interference was postponed until the present time.

The patient has been placed on a McKenna fracture and orthopedic table, which permits three assistants to work with ease in this type of case, one standing between the extended limbs, one on each side of the operator.

The incision which I shall employ is a modification of the goblet-shaped incision described by the late Dr. J. B. Murphy in his Surgical Clinics, the modification being a change in the posterior line of incision in that it is carried farther back

in order to secure a fat-and-fascia flap that will come directly under the elevated gluteus muscle when the great trochanter is removed, thereby fitting this flap into the acetabular cavity with much greater ease and without cutting away or strangulating the pedicle of the flap. The incision is now completed and I am exposing the great trochanter. The fibers of the gluteus muscle are now separated with a Mayo blunt scissors anteriorly and posteriorly to their attachments to the great trochanter. Through this incision I now pass a curved forceps carrying a Gigli saw. The trochanter is removed and the gluteus muscle reflected back, exposing the neck and head of the femur. With a round chisel I chisel away the head from the acetabulum, using care in not destroying the rim of the acetabulum or injuring the Y ligament of Bigelow, which comes into the field at this point. The head is chiseled away in a circular manner, preserving the shape of the head as nearly as possible. With the assistant manipulating the foot and knee I am able to fracture the last part of the head from the acetabular cavity by gradual abduction of the leg. The abduction is carried to the point of dislocating the head, in which position the roughened portion of the head is smoothed off and the acetabular cavity is cleaned of all adherent bone and the head prepared for the reception of the flap. I now fold the flap in under the gluteus muscle from behind by means of three chromicized catgut sutures. These sutures enable me to pull the flap into place with a minimum amount of dislocation of the head. This means that the ligamentous attachments about the joint are disturbed to a minimum degree. This procedure seems to me of much importance in all arthroplastic work. The advantage is that we obtain an inversion of the pedicled flap with a minimum amount of destruction to the anatomic points and the ligamentous attachments about the joint. The flap is now in place, and I am reducing the dislocation, allowing the head to come into its newly rounded socket of fat and fascia. The flap is now secured about the neck of the femur. All bleeding being carefully disposed of, the trochanter is pulled back in place and secured by means of two heavy chromicized catgut sutures applied through holes drilled for

this purpose. I am closing the incision by the ordinary means. A plaster-of-Paris cast will be applied to the body, hip and leg, with the leg in a position of moderate abduction. A Buck extension will also be applied.

My experience in arthroplasty has led me to believe that surgical interference can be introduced in this type of lesion earlier than in any other. This belief is based upon the fact that the media upon which the neisserian organism lives is early destroyed in these joint conditions. Clinically we know the organism does not tend to produce osteomyelitis following joint involvement, for the organism probably dies very early. The pathology is confined largely to the joint itself, there not being a great deal of peri-articular destruction. It is possible, therefore, in my opinion to do an arthroplasty before a great deal of change in the way of contractures of the ligaments and tendons about the joint has taken place. It seems to me that it is of great importance to plan surgical interference according to the etiology of these joint conditions. Every surgeon who has had much experience in bone pathology about joints remembers with what rapidity contractures take place in this anatomic site; therefore, the necessity of classifying those conditions that may be attacked early after ankylosis has been established. My experience has taught me that cases in which neisserian infection is the etiologic factor may be operated on at a relatively early period after ankylosis has taken place.

NEUROMA OF EXTERNAL POPLITEAL NERVE; RESECTION; END-TO-END ANASTOMOSIS

THE second case I wish to present this morning is a little girl of twelve years who had an extensive destruction of the fibula following an attack of osteomyelitis. Some months ago I transplanted a piece of tibia, $9\frac{1}{2}$ inches long, to take the place of the destroyed fibula.¹ In addition to the destruction of the fibula, the external popliteal nerve was also injured.

Seven weeks ago I exposed the popliteal nerve by cutting along the posterior border of the biceps tendon. A large bulbous neuroma, $1\frac{1}{2}$ inches long, was found. This was dissected out. In order to get into healthy nerve above and below the neuroma $2\frac{1}{4}$ inches of nerve were removed and an end-to-end anastomosis produced by putting the leg up in forced flexion, which enabled us to hold the nerve without tension. The leg was held in this position by means of an anterior plaster-of-Paris cast covered with gauze bandages. This position was maintained for fifteen days. When the cast was removed the leg was allowed to come down without force. The cast was then put back, and every three or four days it was removed and motion instituted, until at the end of three and a half weeks the cast was permanently removed and the patient was allowed to rest the leg on a pillow. She was gradually allowed to put weight on the leg, until to-day, seven weeks after operation, she can walk without crutch or cane. Aside from lifting the foot a trifle higher on the affected side in order not to drop the toes, one would scarcely know that there had been an operation performed. The interesting feature in connection with this case will be to note the return of motion in the muscles supplied by the external popliteal nerve, but this will not be looked for for several months to come.

¹ Reported in The Surgical Clinics of Chicago, June, 1919.

CLINIC OF DRS. HUGH McKENNA AND
GEORGE W. HALL

ST. JOSEPH'S HOSPITAL

EXTRAMEDULLARY SPINAL TUMOR

Summary: Diagnosis of extramedullary tumor of spine. Operation—technic of laminectomy.

WE have a third very interesting case for clinic this morning, a woman who gives the history of disturbances of sensation and of locomotion dating from September, 1918. The condition gradually progressed until there was complete paralysis of both legs with disturbance of bladder and bowel practically to the point of paresis. This patient was referred to my service by Dr. George F. Dick and Dr. George W. Hall. I will ask Dr. Hall to give you the neurologic findings.

DR. GEORGE W. HALL: About November 1, 1918 the patient complained of pain localized just to the right of the spine and below the scapula. This extended anteriorly, reaching to the median line in front, near the end of the sternum. About one month later she noticed pain on the left side of the spine, but to a lesser degree.

In February, 1919 she first observed difficulty in walking due to numbness in her feet and stiffness in her limbs. The symptoms gradually grew worse until she became completely paralyzed in both lower extremities in April, 1919. She had noticed some difficulty in passing urine during the latter part of April.

Examination of the cranial nerves was negative. The upper extremities were normal. Beginning at the level of the seventh dorsal vertebra the tests showed marked disturbance of all forms of sensation. Disturbances of pain and temperature sense were more marked on the left side of the body than on

the right side. Tactile and muscle sense were more disturbed on the right side. Abdominal reflexes present; knee-jerks exaggerated, and Babinski's sign positive on both sides. The bladder showed decided retention of urine.

Diagnosis of an extramedullary tumor was made after excluding the possibility of tuberculosis of the spine. While the present findings might indicate an intramedullary tumor, the history of onset with localized radicular pain pointed more to an extramedullary tumor with gradually increasing pressure on the cord producing the picture of a modified Brown-Séquard syndrome later. It occurs occasionally with extramedullary tumors, situated subdurally especially, may present a Brown-Séquard picture early in the course of disease, and pain, as a symptom, remains in the background. So that one has to be on his guard in making his diagnosis. However, when one feels more or less certain that he is dealing with a cord tumor, I believe operation should be recommended, as it may reveal a removable tumor.

DR. MCKENNA: I make a curved incision according to the plan of Frazier, going through the skin and fascia overlying the muscles so as to expose from the third to the eighth dorsal spinous processes. I make another incision through the fascia on either side of the spinous processes. By means of a chisel I separate the muscles from the lateral surfaces of the spinous processes. You see that the amount of bleeding is so small that no clamps are required for the muscles. We are cutting the interspinous ligaments and removing the spinous processes of the fifth, sixth, and seventh dorsal vertebræ. As we remove the lamina of the sixth dorsal vertebra we find a fibrous band which may be a flat tumor or the result of an inflammatory process attached to it. With great care we remove the seventh and fifth, exposing the growth in its entirety. The process lies over the posterior surface of the right half of the cord and extends between the lateral, inner surface of the laminæ and the cord. At the extreme termination of this growth caudalward is a small blood-vessel (Fig. 257). The process is extradural and lies over the fatty capsule covering the dura. The dura bulges above and below this point, giving the appearance of a constriction. There is

not much oozing except from one lamina, to which I apply some Horsley's wax. This fibrous process is removed with ease. We close the wound in four layers, first suturing the muscles, then inserting tension sutures, then suturing the fascia, and finally closing the skin. Small pieces of rubber tubing are placed

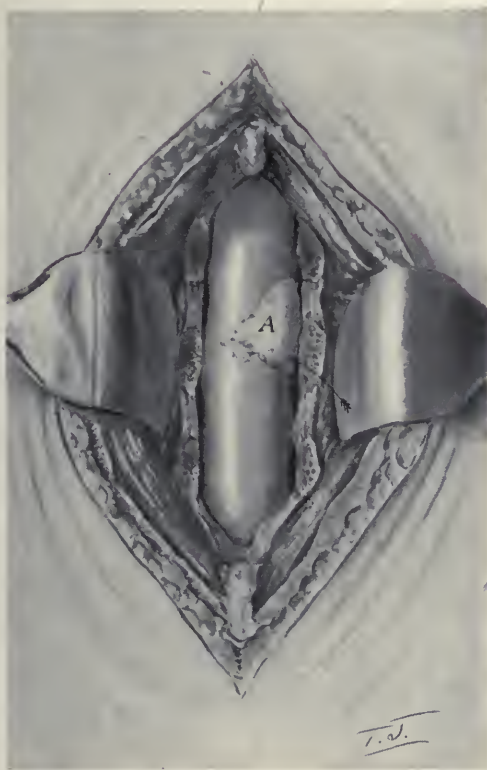


Fig. 257.—The laminae of the fifth, sixth, and seventh thoracic vertebrae have been removed, exposing a fibrous tumor (A) lying extradurally.

over the tension sutures to prevent necrosis according to the plan recommended by Frazier. We have performed this operation according to the plan used in bone work, in that only instruments and sponges were allowed to pass into the wound.

July 22, 1919: We are removing the stitches today, having left them in longer than usual as a precautionary measure to

insure thorough healing on account of the number of vertebral laminae that had been removed. There is some congestion of the wound, probably due to the fact that the patient has been lying on her back, otherwise wound conditions are perfect. Histologically, the tumor removed at operation has proved to be a fibroma.

[Patient observed for several months after operation had not made any improvement. This may be accounted for on the basis of the case coming to operation so late after the onset of the symptoms.]

CLINIC OF DR. ARTHUR DEAN BEVAN

PRESBYTERIAN HOSPITAL

SPLENECTOMY

Summary: A patient presenting signs and symptoms of so-called primary splenic anemia. Technic of splenectomy—the incision—mobilization of the spleen—management of the splenic pedicle—dressings. Value of splenectomy in cases of this type.

THIS patient is a man forty-one years of age, who has been referred to me by my colleague, Dr. Tieken, who has had him under observation for some time. Dr. Tieken has diagnosed the case as one of primary splenic anemia and has advised splenectomy. I have gone over the facts with him, and quite agree with his diagnosis and also with the recommendation to give the patient the benefit of splenectomy.

Dr. Tieken saw the patient some months ago. He had the first hemorrhage from the stomach about eighteen months ago. This was described as a "terrific" hemorrhage, with great loss of blood. He was put to bed and given horse-serum, with the idea that this might assist in controlling the bleeding. He improved after this first hemorrhage, and then about three months ago he had another very severe hemorrhage. He was then sent to the hospital and given oxalate of calcium and horse-serum. Examination of his blood at that time showed 52 per cent. hemoglobin. His red count was 3,200,000. On diet and medication he improved and gained in weight constantly until he was brought to the Presbyterian Hospital on July 21st. On that day he had a small hemorrhage about 3 o'clock in the afternoon. He lives out of town and was put in a baggage car and brought to the hospital, where the hemorrhage continued for a short time and then ceased. Between the last two hemorrhages

he gained in weight, ate very well, and his blood condition improved rapidly. The last count made six weeks ago was 4,100,000 reds, 80 per cent. hemoglobin, and 8200 white cells. The hemorrhages have been from his stomach and the blood vomited. The stools have shown some blood immediately after the hemorrhages, but not in the interim. When he was brought to the hospital his hemoglobin was 60 per cent. and the red cell count 3,500,000. The man has been quite weak and has been kept in bed now for several weeks.

When I first saw and examined him I found a huge spleen which could be readily outlined, extending well below the umbilicus, and a hard, enlarged liver that was also very easily palpated. His color was of a brownish yellow. A complete physical examination failed to reveal any other evidences upon which to base a differential diagnosis. The probable clinical diagnosis, therefore, of both Dr. Ticken and myself is primary splenic anemia.

For a number of weeks now I have had him upon *x-ray* treatments in the hope that this might produce a diminution in the size of the spleen and might produce such an improvement as to make splenectomy unnecessary. There has, however, been little improvement under *x-ray* treatment.

We shall, of course, do this operation under ether anesthesia. The patient is now prepared and completely anesthetized. I am making a large S-shaped incision on the left side, an incision which I have used in a number of splenectomies and which gives admirable exposure, so that we can separate the spleen from the diaphragm and ligate the pedicle more easily than by means of any other incision that I have employed. You will notice that I begin my incision high up in the angle between the ensiform and the costal arch, pass downward and outward to the middle of the rectus, then parallel with the rectus until the incision is about 1 inch below the umbilicus. I then curve the incision outward for about 3 inches so as to complete the figure S. Upon opening the peritoneal cavity the spleen at once comes into view. It is, as you see, quite large, the lower portion is freely movable, but it is very firmly fixed at the upper pole to the diaphragm. The

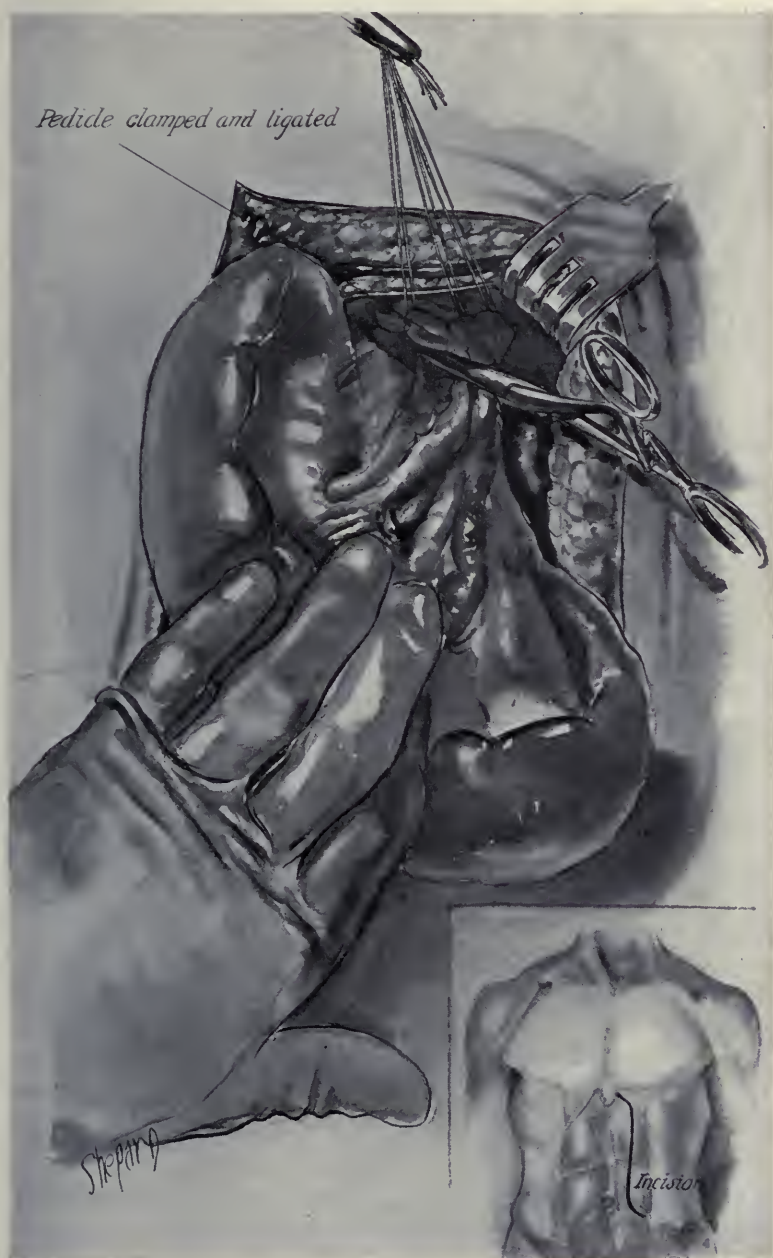


Fig. 258.—Technic of splenectomy. **S**-shaped incision for exposure of field of operation and control of splenic pedicle by clamps and ligature.

liver is enlarged and consists of a good deal of connective tissue which separates the surface into a number of hard nodules. In order to remove the spleen I find that it is necessary first to separate the attachment of the upper pole of the spleen to the diaphragm. I divide this peritoneal ligament between two artery forceps and ligate on both the diaphragmatic and splenic sides. This enables me to bring the spleen well down and out of the wound. I am now ligating the pedicle with three good-sized catgut ligatures. You will notice I am very careful in handling the spleen. I am doing this very gently so as to make no tension on the pedicle because of the risk of injuring some of these huge distended veins. The pedicle is now ligated and dropped back and I find no hemorrhage. I shall, however, leave a cigarette drain in the wound down to the pedicle for forty-eight hours. I am closing the wound in the usual way.

In an effort to vomit the patient, you will notice, is straining, and this straining is accompanied by a considerable flow of bright red blood along the drainage-tube. I immediately reopen the wound and find no hemorrhage whatever from the pedicle, but just a slight oozing from the diaphragm, and I believe, therefore, that the blood that was forced out along the drainage-tube was simply accumulated from this slight oozing from the diaphragm in the pocket from which the spleen was removed. I do not, however, believe that it is of great moment. I feel that it is necessary for me not to prolong the operation by an attempt to ligate or control the raw surface of the diaphragm from which the oozing is coming, and I shall, therefore, simply pack this surface with iodoform gauze, reintroduce the cigarette drain, and close the wound in the usual way. The pads and sponges are now all accounted for, the head surgical nurse and her assistant agreeing in their count. The patient is in very good condition at the close of the operation.

After-history.—The patient had a very stormy history after operation. The cigarette drain was removed at the end of forty-eight hours and the strip of iodoform gauze was removed partly on the third and all of it by the fourth day. The wound healed in a very satisfactory way. The patient, however, passed into

a peculiar toxic condition accompanied by delirium. It was very difficult to manage him. He would want to get out of bed and had to be restrained, sometimes becoming violent. On these occasions we had to resort to the use of morphin so as to relieve this great nervous irritability and secure some sleep. There was little or no fever. The condition seemed to be a peculiar toxemia resulting from the sudden removal of the spleen from the organization. At the end of about three weeks, however, the evidence of toxemia gradually lessened and finally disappeared. The patient became quite rational, took more nourishment, and was finally sent home to recuperate.

A day or two ago (January 15th) he called at my office and I was very much gratified to find that he was in excellent condition. He had gained in weight, regained most of his strength, is quite clear mentally, and was anxious to resume his employment.

These spleen cases that have been classed under the head of "primary splenic anemia" furnish us with a problem that is as yet unsolved. In a general way we can differentiate this group of cases from other enlargements of the spleen. We have learned that splenectomy in these cases offers an excellent prospect of permanent cure. Just why we do not know. The operation is performed practically on the old empirical basis, because it has been demonstrated in a now considerable number of cases that after removal of the spleen in this group of cases the blood returns to normal, the hemorrhages cease, and the patients go on to recovery.

PILONIDAL CYST

Summary: Multiple fistulæ to the left of the anus simulating anal fistulæ—discovery by careful dissection of epithelial lined sac containing pus and hair. Characteristics of pilonidal cysts. Complete excision the only effective treatment.

THE patient I am about to operate upon presents the following history:

He is a man of twenty-eight years. He has had excellent health until about two years ago, when he developed an abscess on the left side of the anus, which was opened, leaving a fistula. This has been operated upon several times, but has never been cured. A number of fistulæ have gradually developed in this region and we find (Fig. 259) five fistulous tracts which are apparently openings into an ischiorectal abscess on the left side, and seem, at first glance, as though they are typical anal fistulæ opening also into the bowel. The several physicians who have operated upon this case have done so with the understanding that they had an ischiorectal abscess and anal fistulæ to deal with. They have split open these fistulous tracts down into the rectum, packed the wound with gauze, and attempted to obtain complete wound healing, but have not been successful in doing so. My examination has so far failed to show any definite connection between these fistulæ and the rectum, and I have some doubts as to the pathology of the condition with which we have to deal.

The patient is now etherized and I shall make a careful dissection of these fistulous tracts and of the entire lesion to determine its pathology, and then decide on the best plan of handling the case. As I open up these fistulous tracts you will notice that I open into a fairly good-sized pocket containing pus and granulation tissue, and you will notice also that I pick out a mass of hair. This at once gives me some information which will probably lead to a correct diagnosis of the condition.

I believe that we probably have to deal with a pilonidal cyst in an unusual position.

Continuing the dissection (Fig. 260, *a*), you will notice that I have now laid open the entire tract, and I find that the abscess

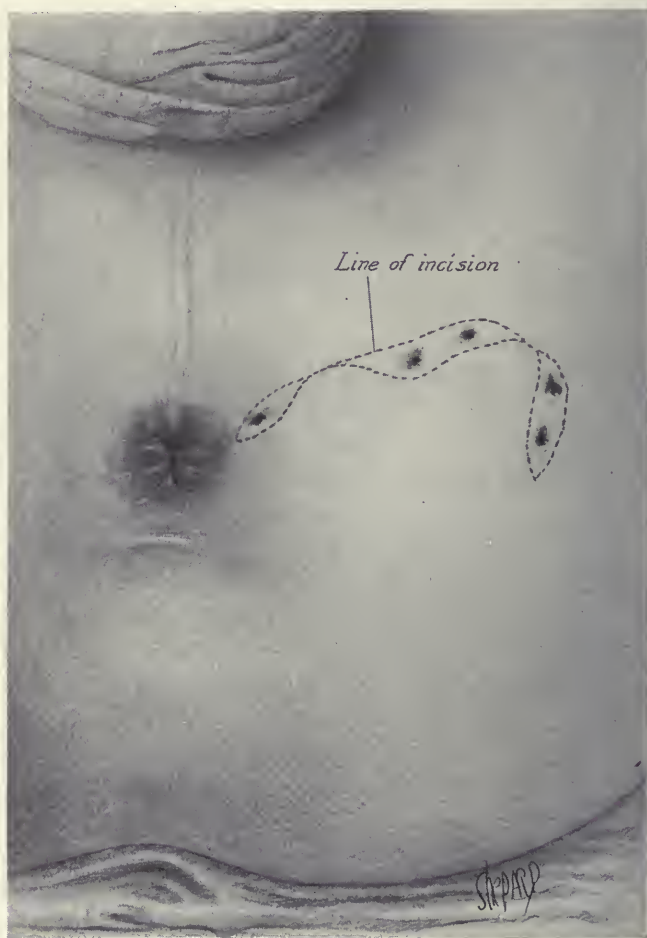


Fig. 259.—Patient in lithotomy position just prior to beginning of operation.
Note five fistulous openings to the left of the anus.

and the fistula do not lead into the rectum. I am carefully dissecting out the entire lesion and doing what one might call a

débridement. My dissection is so complete that I can examine very carefully into the question of whether there is any fistula leading into the rectum, and I find there is none. I now close

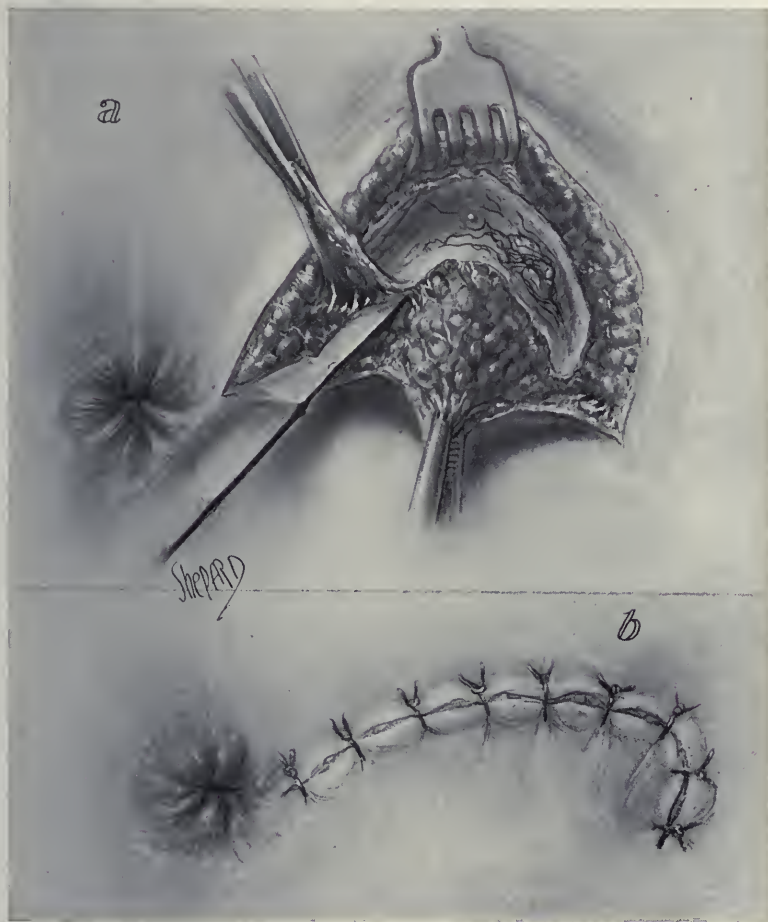


Fig. 260.—*a*, Discovery and removal of cyst containing hair. *b*, Wound closed by interrupted sutures.

the wound with interrupted black silk sutures and cover the line of incision with some sterile zinc oxid paste, so as to protect it as far as possible from any contamination from the contents of the bowel.

Many of you may be surprised at the findings in this case, and some of you may not be familiar with the term "pilonidal cyst." Pilonidal cyst or, better, pilonidal fistula, the term meaning "a nest of hair," is due to an invagination of a bud of skin, usually in the midline, somewhere from the anus to the sacrum. The condition is one in which we have beneath the normal integument in this region a bud of skin of greater or less extent opening on to the surface usually through a very small, pinhole opening, sufficient, however, to permit of the escape of sebaceous material and epithelial débris from the invaginated integument. This little bud of integument also, as a rule, has some hair growing into the sac. Individuals may go through life without ever having any trouble from one of these pilonidal cysts. The trouble does not arise until after they become infected, and then pus and particles of integument may discharge through the little pinhole opening or an abscess may form and a number of fistulæ develop, as has occurred in this case. The practical side of the problem is that these cases are very frequently believed to be ordinary anal fistulæ and are not infrequently so handled without securing a cure of the condition. A cure necessitates a complete removal of the infected invaginated integument, and where this is done and done thoroughly the case is usually permanently cured. I am quite sure that we have had 40 or 50 of these cases on our service that have been operated upon, and the true pathology not recognized, greatly to the distress of the patient and of the surgeon who had undertaken the operation. Only last week we had a boy come in from the Naval Station who had been operated on twice during his service in the United States Navy during the last few months. The case was quite typical, and so we recognized it at a glance. It was in the usual position in the midline over the coccyx and sacrum. He had three or four fistulous tracts, and out of one of these projected a bristle of black hair, which made the diagnosis quite definite. In spite of that fact, this had been operated upon twice, curetted, and packed with gauze without curing the patient. The patient was very much distressed, and believed that he had some incurable disease of the bones of the coccyx and

sacrum, and came to us with this diagnosis. A radical *débride-ment* was easily accomplished and the patient is going on to a permanent cure.

A few months ago a young man of twenty-five years brought some *x-ray* pictures to me at my office, saying that he had some disease of his coccyx and sacrum and wanted me to operate upon him for such a condition. He said that the *x-ray* pictures had been taken by some *x-ray* laboratory at the advice of a physician who had made a diagnosis of some bone lesion. Examination in his case showed that there was no lesion of the bone at all, but that he simply had a pilonidal cyst, which was easily dissected out and the patient cured.

x-RAY BURN OF THE ANUS

Summary: Necessity of complete excision of pathologic tissue in the treatment of *x-ray* burns. Efficacy of local anesthetic reinforced by morphin hypodermically.

THE patient I shall operate on this morning comes to us because we have had several similar cases; I reported one of these in the Surgical Clinics of Chicago¹ some months ago. This is one of the most distressing pictures that we see in our work. This gentleman comes from a southwestern state. About six months ago, because he had pruritus ani, his local physician had a colleague, who was using the *x-ray*, give him several *x-ray* exposures. Very shortly after these *x-ray* exposures a very extensive *x-ray* burn developed about the anus, and the patient has practically been an invalid since that time. He comes to us now in a most pitiable condition. He has, as you see as I separate the buttocks, an *x-ray* burn around the anus about 6 inches in length and about 3 inches in width. The skin in this area has been destroyed by the *x-ray* and there is the ulcerating, burned tissue which is so typical of an *x-ray* burn. These lesions are very painful. Situated here about the anus they are particularly painful because every move the patient makes produces pain. When the patient has a bowel movement it is very often excruciatingly painful. We have been fortunate, or possibly unfortunate, in this clinic in having to deal with a large number of *x-ray* burns, and have learned that the basic principle involved in their treatment is the necessity of removing the injured tissue, and then in some way, either by skin-grafting or plastic or granulation, obtaining complete repair. In the case which I reported previously in the Surgical Clinics we had a burn about two-thirds the size of this present one to deal with, and obtained one of the most satisfactory results that we have ever attained in a surgical operation, and I am quite hopeful of duplicating that in this case.

¹ Bevan, Surgical Clinics of Chicago, Vol. I, No. 6, p. 1240.

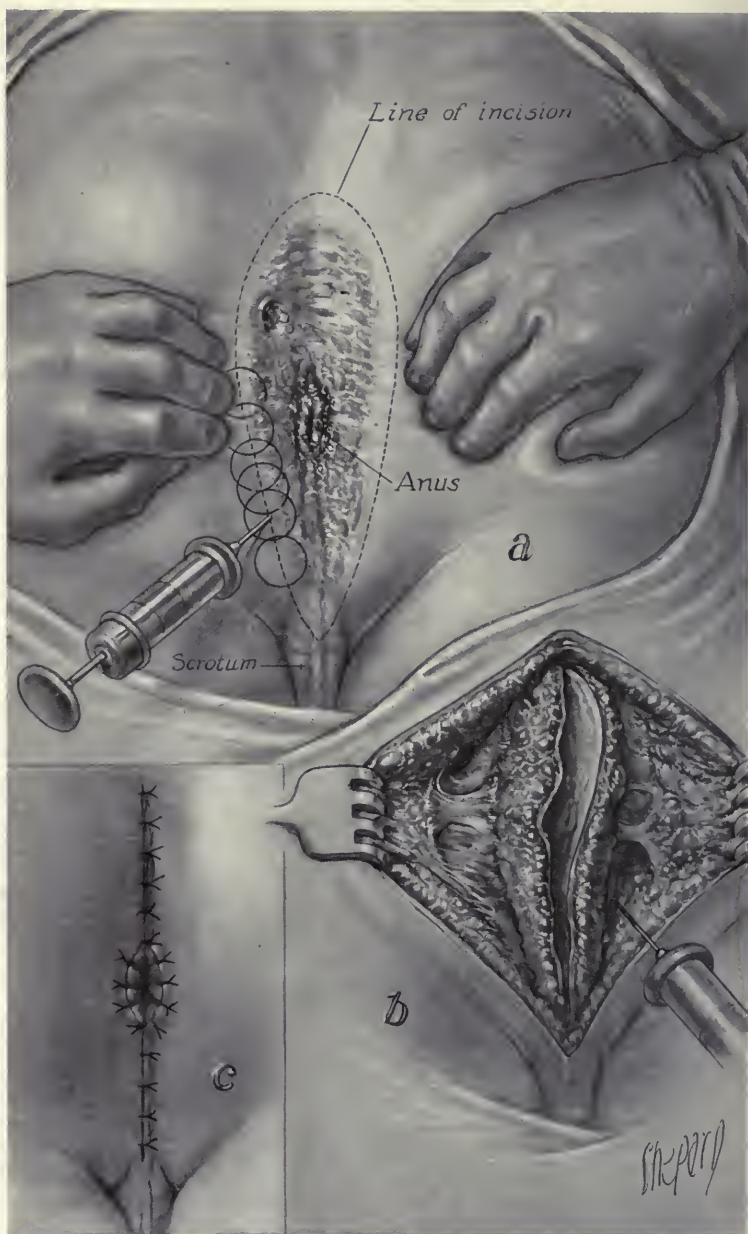


Fig. 261.

The patient comes up to the operating room with a sore throat this morning. I had intended to do this under general anesthesia, as I did in the first case, but on looking at his throat, which is raw and covered with mucus and pus, I feel satisfied that I would run a great deal of risk if we gave him a general anesthetic. On the other hand, his general condition is fairly good, and I have decided, therefore, to do this under local anesthesia. I have decided, however, to give this particular case, on account of the great pain that he has been suffering, $\frac{1}{4}$ grain of morphin preceding the operation. The patient is now ready for operation. As you see, we have placed him on his face on the operating table and have broken the operating table in two in the middle, so as to bring the buttocks prominently into view with the extremities and head lower on either side. I put several soft pillows under the man's chest, abdomen, and shoulders so as to make him comfortable in this unusual position.

I infiltrate the entire operative field and shall use a large amount of anesthetizing fluid. He has some pain on the introduction of the first needle. This whole area has been very sensitive. You notice, however, as I proceed from our first area of infiltration that he has little or no sensation in the resulting infiltration of the field. The x-ray burn is quite definitely outlined. I shall go well outside of this, about $\frac{1}{2}$ inch, so as to be sure and remove all the involved tissues. I dissect out this large elliptic area (Fig. 261, *a*, *b*). As I come down to the anus it is my purpose to bring down the mucous membrane of the rectum as we do in a Whitehead operation, for a distance of probably $\frac{3}{4}$ inch, but instead of removing the mucous membrane we save it and sew it to the skin. Dr. Herb has just called my attention to the fact that in this operation the patient has gone sound asleep. This, of course, is the effect of the morphin relieving the pain. He has not been sleeping well for a number of days. I want particularly to call your attention to the fact that here is a patient in whom the local anesthetic is so effective

Fig. 261.—*a*, Extent of lesion, proposed line of incision and local infiltration with anesthetizing solution. *b*, Dissection nearly completed. *c*, Closure; mucous membrane of rectum sutured to normal skin.

that in doing this operation here on this area which, without an anesthetic would be exquisitely sensitive, the patient is sleeping practically throughout the entire procedure. I want to emphasize also the fact that we have not used scopolamin, but simply $\frac{1}{4}$ grain of morphin. We have about completed the operation in the sense that we have removed the entire integument that has been injured by the x -ray burn, and we have separated and brought down the mucous membrane of the rectum for a distance of about $\frac{3}{4}$ inch. There simply remains the necessity of closing by suture the line of incision. I shall do this with four or five silkworm-gut sutures and then stitch the integument to the mucous membrane of the rectum with eight or ten fine black silk sutures (Fig. 261, c).

An interesting fact developed in the case which we operated on previously, that after the removal of the injured tissue the pain left almost immediately. The patient had been taking quite a bit of morphin and found he could get along with little or no morphin. That has been, in general, our experience in x -ray burns. The pain of x -ray burns is peculiar in this respect. Something has happened in the histology of the lesion which produces neuralgia from injury of the nerves involved in the x -ray burn tissue, and when the burned tissue is removed the pain disappears almost as when the dentist removes the pulp of a tooth. I think the parallel is a fair one.

We cover this whole area with zinc oxid paste and send the sleepy patient back to his room.

POSTOPERATIVE VENTRAL HERNIA

Summary: Technic of extraperitoneal closure of large ventral hernias. Wound closure—the button suture. Importance of thorough postoperative care.

THE patient upon whom I shall operate this morning is a woman of fifty, who weighs about 225 pounds, and who was operated on about two years ago for gall-stones. The surgeon removed the gall-bladder and the appendix at the same time. The operation was followed by some infection in the wound, evidently some sloughing of the abdominal wall, and resulted in this huge postoperative hernia which, when the patient stands, is as large as an adult human head. The neck of the sac, that is, the opening in the abdominal wall, measures about 6 inches from above downward and about 3 inches from side to side, and out of this rolls an enormous hernial sac, which drops down as far as Poupart's ligament when the patient is in the erect position and contains apparently about one-third of the abdominal contents. She has been wearing an abdominal support, but this gives her comparatively little relief. The patient has hesitated about having the operation done because she has taken ether on several occasions and each time has been nauseated for days.

In studying the case carefully I find the patient's general condition is good; her heart, kidneys, and lungs show no organic disease. The blood-pressure is about 150 and, except for the fact that she is such a stout woman, she is a fairly good surgical risk. On account of her history of having had such great distress after ether anesthesia, I have determined to do this operation under a local anesthetic.

In the center of the old incision, as you see, is the thin part of the scar, about 4 or 5 inches long and 2 inches wide. This, of course, we shall dissect out. I have not given this patient any morphin before the local anesthetic because she states that morphin nauseates her badly. I have told my head surgical nurse to prepare a large amount of local anesthetic, and we are

using this morning $\frac{1}{2}$ of 1 per cent. novocain with some adrenalin. On account of the large amount of fluid which we shall probably use I am cutting down the adrenalin to about 1 in 250,000.

I begin now to infiltrate the operative field, and I not only infiltrate about the scar, but I shall also infiltrate pretty deeply the outer side of the hernia, with the hope of blocking the nerve-supply which is derived from the seventh, eighth, ninth, and tenth intercostal nerves. The operative field is now quite insensitive and I begin my dissection. I remove the original incision, including the old, thin scar. My incision, as you see, is about 12 or 14 inches in length (Fig. 262, *a*). I dissect out the old scar completely, and I have to do this with a great deal of care, because for an area about 2 inches square it is very closely attached to the thin-walled peritoneal sac. I am now able to remove this scar and integument completely. Drawing the sac carefully into the field, you see that it is a huge affair. It is my purpose not to open the peritoneum at all. There have been no obstructive symptoms in this case, and I feel quite confident that we can obtain a much better result with much greater safety if we do not open the peritoneal cavity at all. The technic which I shall adopt here has been carefully thought out and has been applied in a large number of these large postoperative hernias. As I continue the dissection of the sac, you see that it is necessary for me to have two assistants use very large retractors, one in each hand, so that I have my operative field well exposed by these four retractors. It is necessary, too, as I roll this great hernia out into view to infiltrate with local anesthetic ahead of my knife. I do not hesitate to use a large amount of fluid and shall probably use from 10 to 15 ounces in the operation. Gradually we now bring into view the entire sac and separate it from the superficial fat. I can outline very well the opening in the abdominal muscles through which the hernia protrudes. My argument in favor of not opening the sac is this: If I did open this huge sac I should probably find that I would have to separate the intestines from the peritoneum for a considerable distance, leaving a raw surface where adhesions would be formed. As there have been no symptoms or even suggestions of obstructive symptoms, I

assume that there is nothing in the present condition of this hernia

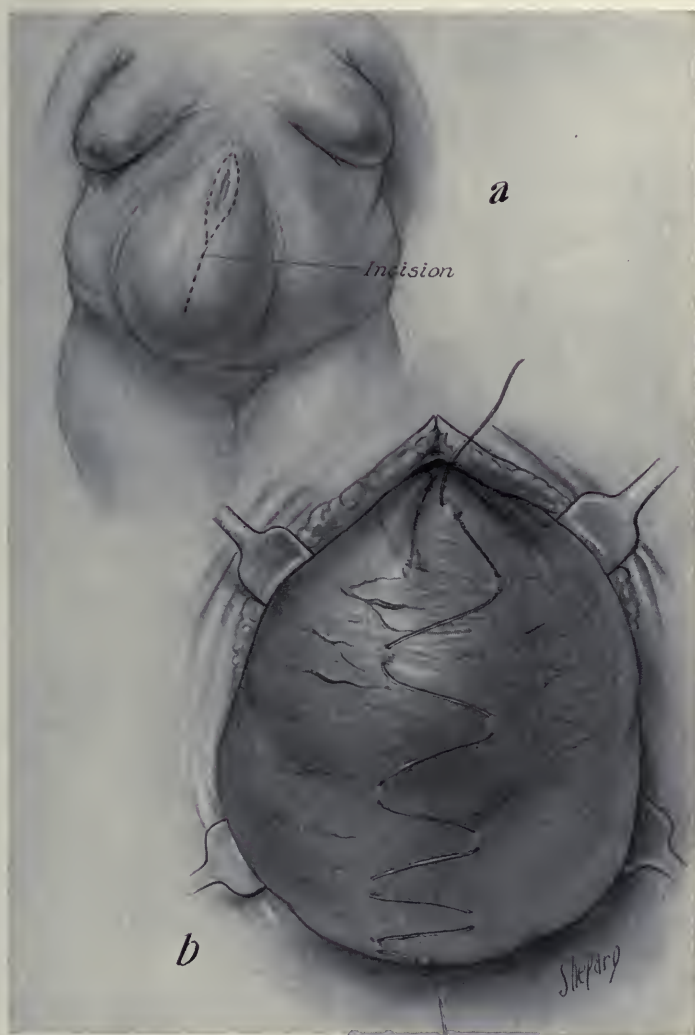


Fig. 262.—*a*, Relative extent of hernia. Note line of incision. *b*, First reefing stitch in peritoneum inserted and ready to be tied.

that produces any interference with intestinal function. If, however, we made an extensive dissection, in the re-formation of

adhesions such obstructive symptoms might easily develop. Then, too, it is very much safer from the standpoint of infection. We run little or no risk of peritonitis if we do not open into the peritoneum. We run little or no risk of injury to the intestine with a resulting fecal fistula, which not infrequently follows operations for these large abdominal hernia. Then again, as far as the technic of the operation itself is concerned, it is very much easier to complete it if we do not have the contents of the abdomen rolling out in our field and held back only by massive abdominal pads which would be required if we opened this peritoneal sac.

Now that the sac is completely isolated, how shall we deal with it? I want you to follow me in this technic. I shall reef this sac up by three or four rows of moderate size catgut suture, beginning at the upper end of the sac, taking in about 2 to 3 inches of the peritoneum in my first row. I put in my first reefing suture, which extends from the upper extremity to the lower extremity of the sac (Fig. 262, *b*). This is followed by a second similar suture, taking in about 3 inches of the sac. This is followed by a third and finally by a fourth suture (Fig. 263, *c*). You will see now that we have obliterated the entire sac, and we come down to the opening in the musculature of the abdominal wall. Let us study this carefully for a moment. The outer edge of this opening is formed by the external oblique, internal oblique, and transversalis, with a few fibers of the rectus abdominis muscle which are external to the line of incision made in the original operation. The inner edge of the opening contains very few muscle-fibers. These are remnants of the atrophied and paralyzed rectus abdominis, atrophied and paralyzed because the nerve-supply has been divided. I therefore practically have little or no rectus abdominis to help us out in this closure, and it will be necessary to draw the other abdominal muscles, the external oblique, internal oblique, and transversalis, from the outer side to the fibrous tissue, forming an arch in the midline. In order to do this so that we will obtain a good closure I find that it is necessary to use what we call our "button" sutures. These have proved to be of very great service in our abdominal work,

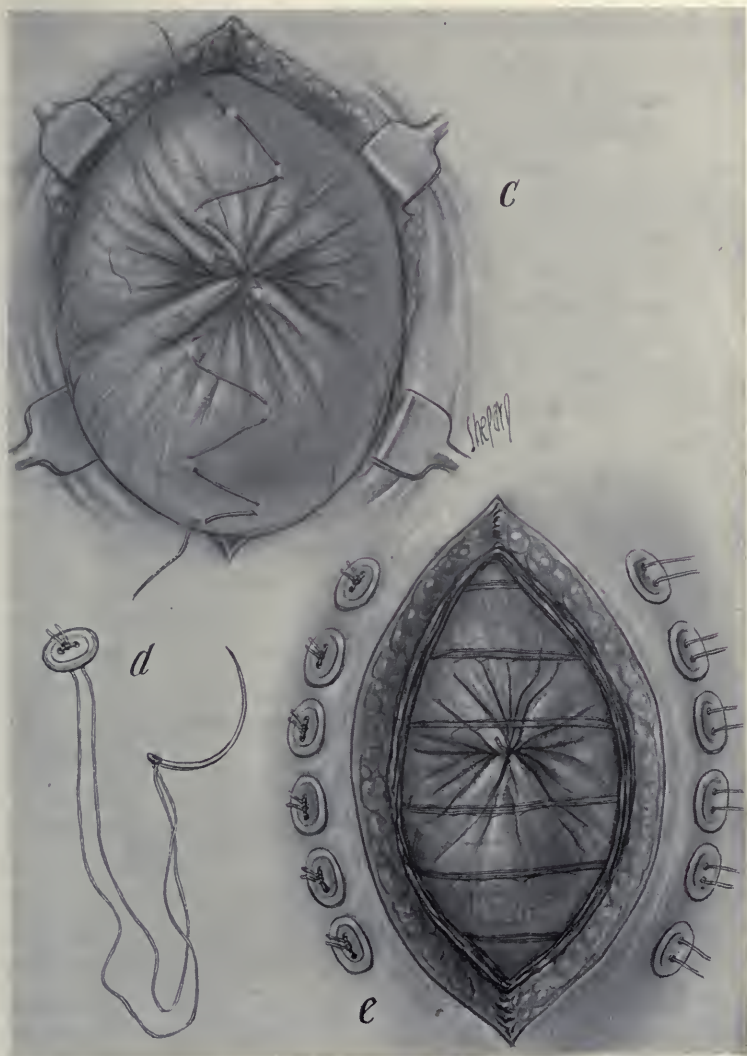


Fig. 263.—*c*, First, second, and third reefing sutures inserted and tied; fourth suture in place. *d*, Button suture. *e*, Button sutures in place ready for closure.

not only in operating on these large ventral herniæ but also in operating on individuals with very large pendulous abdomens, especially in bile-tract work and in operations on the stomach.

I do not know that we have any claim for originality in this, and yet we have improved the technic of the old mattress suture, so that it is much more satisfactory than anything that we previously have been able to employ. For a time in these mattress sutures we used pieces of rubber tube. In years past they used goose quills and the suture was known as the quill suture. Other materials have been employed, such as lead plates, and for a time we used pieces of cigarette drainage-tubes about $\frac{3}{4}$ to 1 inch in length. One day some time ago, however, I told my head surgical nurse to get some large white buttons about 1 inch in diameter and have them sterilized, and we would use them in our subsequent work, and I have found them of the greatest possible value. We shall use them this morning. I shall now place the first of our button sutures through all the abdominal wall except the peritoneum, and shall use rather heavy black silk that has been boiled in carbolic acid and wax and has been smoothed, so that it will run readily through the tissues, with a piece of sterile gauze. On the whole, this heavy silk is better than silkworm-gut. There is practically no possibility of breaking it, while the silkworm-gut is occasionally brittle and one of the sutures breaks. You will notice that the nurse hands me these button sutures with the heavy silk tied on one side of the button and hands me the needle threaded, one button at a time (Fig. 263, *d*). As I draw the needle through on the opposite side from the attached button I divide the silk and pass the two ends of the silk through the second button (Fig. 263, *e*), and then draw the edges of the incision together and tie in a hard knot. A very great amount of tension can be employed in this way without cutting through the tissues, without producing pain, and without running much risk of a stitch abscess from cutting of the suture and resulting infection. We have now introduced the six sutures and have drawn the edges of the abdominal opening well together. It simply remains for us to put in the half-dozen silkworm-gut sutures between these button sutures so as to bring the superficial fat and integument together, and then we make a very accurate closure of the skin by fine interrupted silk.

You will notice that this patient has stood the operation

admirably, that we have used 12 or 14 ounces of the novocain solution, and that the operation has not been a difficult one, and has been tedious simply from its magnitude. I can recommend to you the technic which we have employed this morning as one which has been much more satisfactory in handling these large ventral herniæ than any other plan that we have adopted. The avoidance of a general anesthetic is a matter of great importance. It makes the operation very much safer. The avoidance of entering the peritoneal cavity makes the operation very much safer and very much easier of performance, and the use of the button sutures does much to ensure our obtaining a good closure of the hernial opening and a good permanent result.

I want to say a word or two in regard to the after-management, which is of great importance. First, in regard to the primary dressing: this should be a fairly copious layer of sterile gauze held in position by broad, long adhesive strips, going two-thirds the way around the entire abdomen. It is held in place snugly by abdominal pads and a scultetus bandage. The patient should be allowed to roll about in bed. A very large woman of this kind should not be permitted to sit up for ten days, but she can be rolled from side to side and can be propped up with a back-rest a number of times each day. The temperature and dressings should be very closely watched, and if there is any cutting of stitches or any stitch infection, that particular stitch should be removed, the line of incision again sterilized with alcohol, and the entire wound redressed. It is usually our rule to remove every other one of the button sutures by about the ninth or tenth day, leaving the balance until the twelfth or even fourteenth day. Where a button suture cuts early, it is removed, the wound resterilized, and that particular part of the wound carefully strapped again with adhesive. The after-management of these cases is a matter of very great importance and has much to do with the end-result.

DEMONSTRATION OF THREE ABDOMINAL CASES

Summary: Pyloric stenosis in a woman seventy-five years of age. Differential diagnosis of carcinoma. Exploratory operation—choice of anesthetic—posterior gastro-enterostomy. Postoperative treatment.

A case of probable peritoneal tuberculosis; exploratory under local anesthesia; exploratory valuable only from the standpoint of diagnosis.

A case of benign, non-ulcerous stenosis of the pylorus in an adult male. Indications for operative treatment of pyloric stenosis due to ulcer. Operation and results in present case.

I SHALL have the opportunity of presenting to you this morning 3 abdominal cases. The first patient is one of Dr. B. W. Sippy's, a woman of seventy-five, who has been under observation for a number of months with pyloric obstruction which has improved under ulcer management. There is, however, an open question as to whether this is an ulcer or a carcinoma. On account of her age and general condition although operation has been considered it has not been urged until the last week. She has improved under ulcer management, increased somewhat in weight, gained some strength, and there has been a diminution in the amount of retention after the seven-hour meal. There has, however, been a little persistent occult blood. Weighing the evidence, the diagnosis is uncertain between pyloric obstruction due to ulcer and pyloric obstruction due to carcinoma. In the last few days there has been an excessive watery secretion poured out by the stomach, which has reduced the strength of the patient, markedly dehydrated her in spite of large amounts of rectal fluids, and made it necessary to urge operative interference.

I have analyzed the facts from the standpoint of a choice of anesthetic and have discussed this with both Dr. Sippy and our anesthetist, Dr. Isabella Herb, and have concluded to do the operation under drop ether, keeping the patient under ether for as short a time as possible and making the operation as rapid as is consistent with good technic. About a half-hour ago the

patient had her stomach washed out and has been given 1000 c.c. of normal salt solution subcutaneously.

Under ether I make the usual midline incision between the ensiform and the umbilicus. On opening the peritoneal cavity I draw the stomach into view. As I draw the greater omentum and the greater curvature of the stomach out of the peritoneal

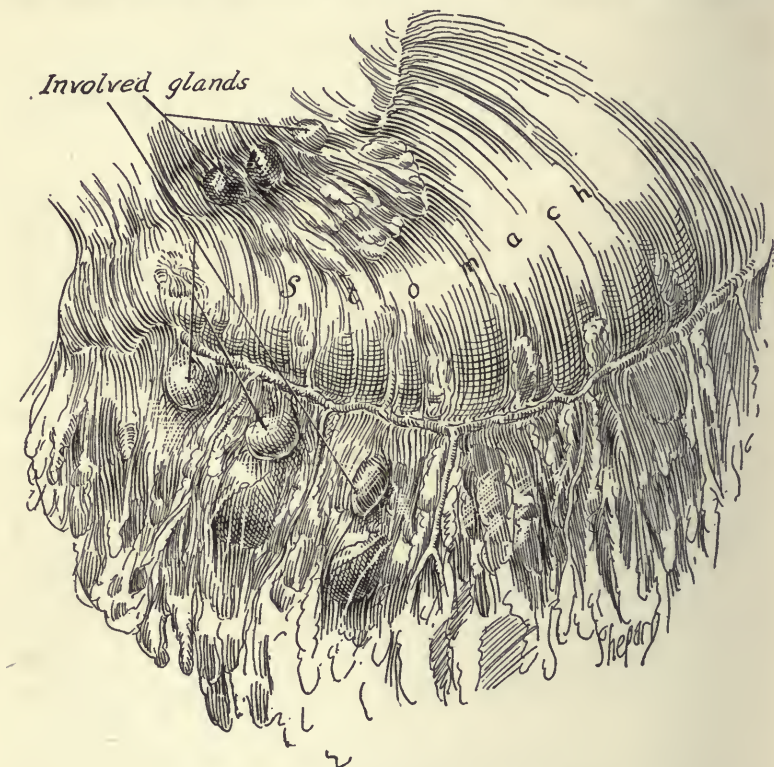


Fig. 264.—Regional involvement of lymph-glands secondary to carcinoma of the pylorus.

cavity I am distressed to find a hard mass of glands along the greater curvature which are typically and distinctly carcinomatous (Fig. 264). Drawing the pylorus into view, I find a small circular carcinoma at the pylorus, and I find also some enlarged lymphatic glands along the lesser curvature of the stomach. The glandular involvement is so extensive that a radical operation

is out of the question. We shall, therefore, do a rapid posterior gastro-enterostomy as a palliative measure.

I now draw the stomach, transverse colon, and large omentum entirely out of the peritoneal cavity and fold them in a moist, warm gauze compress. I expose the lower surface of the transverse mesocolon and find an avascular area. I perforate the peritoneum with a pair of artery forceps and open into the lesser peritoneal cavity. I stretch this opening until it is about 2

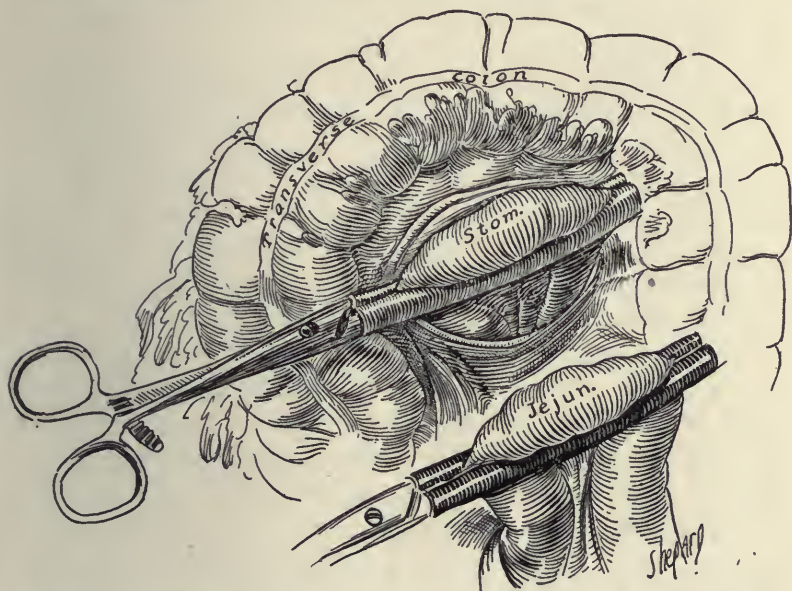


Fig. 265.—Stomach and jejunum secured by clamps preparatory to union by suture.

inches in length, so I can readily draw out the posterior surface of the stomach. I draw out enough so that I can clamp about 2 inches of the stomach in a pair of intestinal clamps. I now pick up the jejunum as close as I can to its beginning and clamp about 2 inches of the jejunum with intestinal clamps. I bring the clamped stomach and clamped jejunum together and find they come readily together without any tension (Fig. 265). I shall, therefore, proceed to make a posterior gastro-enterostomy. I use here, as we always do in this clinic in these stomach and

intestinal anastomoses, Pagenstecher linen. I use three rows—one in the mucosa, one through the muscularis and peritoneum, and a third, a Lembert suture. After completing the anastomosis I sew the opening in the transverse colon with three catgut stitches to the jejunum so as to prevent any strangulation at this point from a knuckle of intestine getting into the loop in the transverse mesocolon. Very carefully the abdominal contents are replaced and the great omentum is carefully unfolded and pushed over the intestine. The external incision is closed in the usual way.

The operation, as you see, has been a very rapid one, taking but about twenty minutes, and for the most part has been done without the use of very much ether. You noticed that I had to ask Dr. Herb to give the patient a few additional whiffs as we were replacing the stomach and intestine, and again during our closure. During the greater part of the operation the ether was suspended entirely. The pads and sponges are accounted for and the patient is in very good general condition.

I want to say a word in regard to the diagnosis in this case. You can see from the brief facts which I have given you that the clinical diagnosis was uncertain. I was rather hopeful that the lesion might be an ulcer because of the long-standing history and because of the definite improvement under ulcer management, the gain in weight, etc., and yet with the age of the patient taken into consideration and the fact that the stool had some occult blood, we had to be prepared for the possibility of carcinoma.

After-history.—The patient was given, following operation, 8 ounces of normal salt every four hours per rectum for the first twenty-four hours. She was unable to void and had to be catheterized for two or three days. She did not vomit after operation, however, and at the end of twenty-four hours we began giving her water, milk, and a little oatmeal and cream by mouth. She was able to retain this. Her temperature did not go over 99.5° F. and she went on to a good operative recovery, with great relief from her stomach symptoms. On account of her age and the tense, scirrhus-like character of the carcinoma, I take it for granted that the tumor is a slow-growing one and

that the gastro-enterostomy may give her a long palliation. In a younger individual, say a person of forty-five or fifty, I think that both Dr. Sippy and myself would have urged operation much earlier, on the basis that there was a definite possibility of carcinoma. In a young individual and in an individual who is a fair surgical risk an early exploratory would have demonstrated the exact character of the condition and enabled us to give the patient the benefit of a radical operation if one was indicated.

The second patient is a woman who comes to us with the history of having had three previous abdominal operations—one about three years ago, in which an ovarian tumor was removed; one about one year ago, in which a second ovarian tumor was removed; and the third, an exploratory operation which was done about two months ago, in which a large amount of ascitic fluid was allowed to escape; when the peritoneal cavity was opened the peritoneum was found studded with small yellowish-gray bodies which the operator thought was probably tuberculosis of the peritoneum. The patient comes to us now with probably $\frac{1}{2}$ gallon of fluid in the peritoneal cavity. Her general condition is bad. We have attempted to obtain from the previous operators a statement in regard to the pathology of the condition found at the time of the other operations, but we have been unable to do this. I have, therefore, concluded to make an exploratory today under local anesthesia, to allow the peritoneal fluid to drain off and to obtain a section of the peritoneum or omentum for the purpose of having it examined histologically to determine the exact character of the lesion.

From the history, of course, one is inclined to believe that the case is one of a papillomatous ovarian tumor with implantations on the peritoneum. On the other hand, of course, it is possible that the surgeon who did the third operation is correct, and it may be a case of tuberculous peritonitis in a patient who previously had ovarian tumors removed. At any rate, we cannot handle the case intelligently until we determine the exact pathology of the condition.

You notice that there are three scars parallel to each other in the midline between the umbilicus and symphysis. I shall make a fourth small incision to the right of the midline and shall infiltrate the integument, superficial fascia, and abdominal wall very fully with $\frac{1}{2}$ of 1 per cent. novocain with adrenalin added. I wait a few moments until the tissues are perfectly anesthetized, and then cut down, as I am compelled here, through the skin,

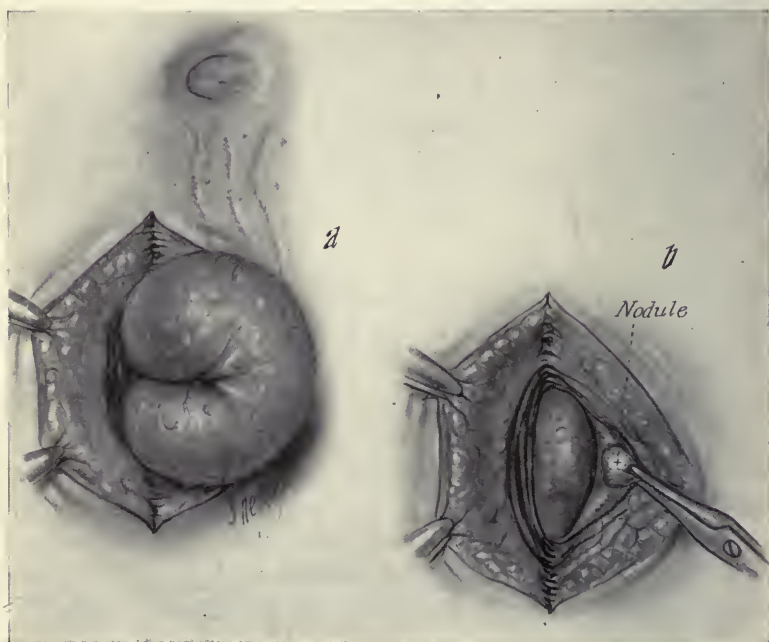


Fig. 266.—*a*, Intestine dotted with caviar-like bodies. *b*, Removal of nodule from parietal peritoneum for microscopic study.

superficial fascia, and anterior sheath of the rectus, separate the rectus at about the junction of the inner third and outer two-thirds, and come down to the peritoneum. On opening the peritoneum you see a large amount of yellowish, clear fluid escapes. Then all of a sudden it stops flowing, and I notice the intestine has crowded its way into the incision and has blocked up the opening. I draw this intestine out into view and you

notice it is covered by small caviar-like bodies that are suggestive of tuberculosis; still, they may be papillomatous implantations (Fig. 266, *a*).

Pushing the intestine to one side with a pair of forceps, I allow the fluid to escape. I roll the patient over on her right side and, catching the intestine back with blunt, closed artery forceps, I allow all the peritoneal fluid, about $\frac{1}{2}$ gallon or more, to pour out into the peritoneal cavity. I now ask the patient to roll back to the recumbent position. Introducing my finger into the incision I find I can feel a little nodule, about half as big as a split pea, just to the inner side of the incision. I draw this bit of peritoneum into view and find it is a definite, small, yellowish-white mass. I now dissect this out for microscopic examination (Fig. 266, *b*).

After-history.—The microscopic examination unfortunately showed that the small piece of tissue removed was carcinomatous—a malignant papilloma. It therefore became evident that we could do nothing except make the patient as comfortable as possible both mentally and physically. If any agent was employed at all we might employ a few deep *x*-ray treatments with the skin well protected so as to avoid absolutely any possibility of a burn.

A few days ago we had a very similar clinical picture as far as the physical examination of the abdomen is concerned, in a young man about twenty-two years of age, who came to the hospital with rather vague symptoms, stating that for about three months he had been losing weight and strength. He had had some pains in the abdomen, nothing very severe, and he had noticed within the last few weeks that the abdomen was getting distinctly larger. There was little else in the history. On careful examination we found that he had no fever, that there was no lesion of the kidneys or heart or liver to account for the ascites. There was no history of neoplasm in the abdomen and the clinical diagnosis of tuberculous peritonitis was made.

There is a legend among surgeons that tuberculous peritonitis is frequently greatly benefited by exploratory operation, that is,

the exploratory operation *per se* is in some mysterious way curative, and this conclusion has been arrived at because after many of these exploratories are made and a bit of tissue removed and a definite diagnosis of tuberculous peritonitis has been arrived at, the surgeon has been surprised to find that the patients have gone on to recovery, and for a time it seemed probable that the exploratory contributed to that recovery. As a matter of fact, I do not accept this view, and am rather in sympathy with the conclusions arrived at by the late Dr. Christian Fenger after studying many of these cases, namely, that an exploratory in tuberculous peritonitis is of value simply in determining the diagnosis and enabling the surgeon to place the patient on the right course of management, which amounts practically to the same treatment as that of lung tuberculosis, and obtaining in many cases a cure. I do not, however, feel that an exploratory operation itself, outside of determining the diagnosis, is in any way curative.

In this young man's case we opened the peritoneal cavity under local anesthesia and found it filled with about 1 gallon of clear yellowish fluid. The peritoneum was thickened and covered by caviar-like masses, perfectly consistent with tuberculosis. I removed a section of this for histologic examination and found the typical picture of tuberculosis. I shall place the patient on fresh air and building-up treatment, aiming to increase his resistance. I feel from my previous experience that there is at least a faint chance of his going on to a permanent recovery.

The third patient is also a stomach case, one of Dr. B. W. Sippy's cases, that has been under observation for a number of months. The patient is an unusually intelligent man, who has suffered so much from his stomach that he has religiously followed out the instructions given him with the hope of becoming cured without operative interference. He has kept himself in very good general condition, but the essential facts are now these: he has a retention of 600 to 1000 c.c. after a seven-hour meal, and it is necessary for him to aspirate his stomach every night before going to bed in order to obtain any comfort. As long as he does

this and is extremely careful about his diet, he can maintain himself in fairly good condition and hold his weight fairly well. The clinical diagnosis is that of ulcer with an old scar producing pyloric obstruction. There are no active symptoms of ulcer. There is no occult blood in the stool. There is nothing to suggest in this case a carcinoma, although the man is about fifty and, of course, in the carcinomatous age. He has marked visible peristalsis. The x -ray evidence, the visible peristalsis, and the retention all point definitely to pyloric obstruction. One cannot exclude absolutely the possibility of carcinoma, because carcinoma might have developed at any time at the site of the old ulcer, but the clinical diagnosis is, with a good deal of certainty, that of benign obstruction. The patient has rather resisted the thought of operation until lately, but is now very anxious to have operative relief. As you probably know, Dr. Sippy feels that in the vast majority of cases under ulcer management pyloric obstruction gradually disappears as the ulcer heals, as the inflammatory edema diminishes, and as the pylorospasm associated with acute ulcer is overcome. He finds, however, that there are cases where the scar tissue is so great that even after the ulcer is healed the stricture from the scar tissue remains, and these cases must be relieved by operative interference.

We shall do this operation under ether. I make a large incision from the ensiform to the umbilicus. Opening the peritoneal cavity and drawing the stomach into view, I am rather surprised at the findings. This stomach is very large, there are no adhesions about the pylorus, and there is no evidence of scar extending into the peritoneum, as is so frequent in the dense scars the result of healed ulcers. On the other hand, there is rather the picture that one finds in congenital pyloric stenosis, a dense mass of tissue at the pylorus that is smooth and round, not involving the peritoneum, but apparently involving the musculature and probably as well the mucosa and submucosa (Fig. 267). I cannot make my thumb and finger meet through the pylorus. There seems to be no caliber of any size. It is quite definitely a pyloric obstruction, but of the peculiar type found in congenital pyloric stenosis without any evidence of

scar involving the peritoneum, which is the rule in these ulcer cases. There is no evidence whatever of carcinoma and no glandular involvement. The gall-bladder is normal. Introducing my hand into the general peritoneal cavity I find nothing wrong in the large intestine either in the cecum or in the sigmoid. We shall do our usual posterior gastro-enterostomy, as I did in the first case.

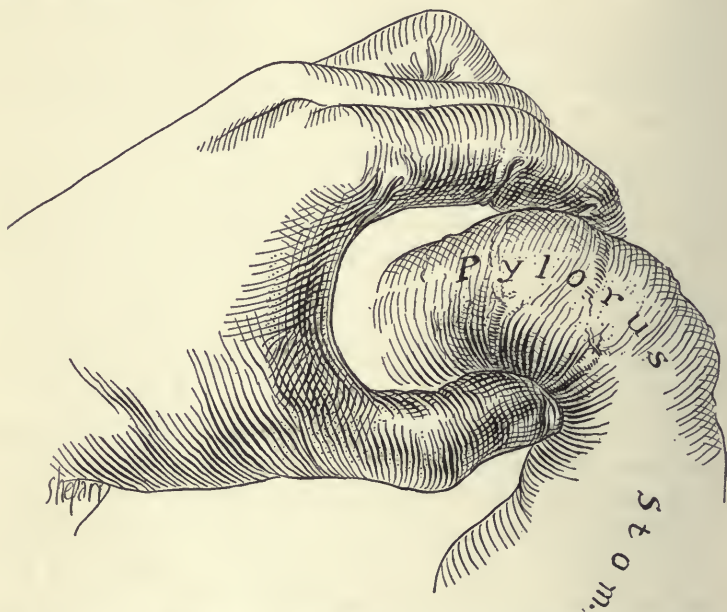


Fig. 267.—Firm, smooth tumor mass at pylorus in a man of fifty resembling that characteristic of congenital pyloric stenosis.

I want to call your attention to the fact that although we have here a complete clinical picture of pyloric stenosis and thickening at the pylorus, we have an unusual picture to deal with.

After-history.—The patient did surprisingly well after the operation. I saw him the following morning and at no time was his temperature above normal. He had some distention from gas in the lower abdomen, but I did not hesitate to allow him to get out of bed and sit on a commode, so that he could relieve himself from this gas distention. He did this with the alacrity of

a man who is quite well, without any hesitation, and seemingly without any pain or distress. It is interesting to note, too, that by sitting on a commode he could relieve himself of the gas distention immediately and without any trouble, while lying in bed and attempting to use the bed-pan he found this impossible. On the second day we began fluids by mouth and he went on to a very satisfactory and complete recovery.

CLINIC OF DR. GATEWOOD

PRESBYTERIAN HOSPITAL

PAPILLARY CYSTADENOMA OF THE BREAST IN A CHILD

Summary: Surgical pathology of breast tumors in children. Diagnosis in present case. Surgical removal.

THIS little girl is eleven years old. About two months ago her mother found a small nodule in the child's right breast just below and to the inner side of the nipple. This nodule has not been tender, and the mother states that the girl has not complained of pain since she found the tumor. She thinks it is slightly larger than when it was discovered.

Our little patient has never been seriously ill. She has escaped all children's diseases except measles and pertussis. She has not begun to menstruate. Two years ago she was treated with x-ray for a "swelling in the right breast." The exact nature of this swelling cannot be ascertained, but the mother does not believe that there was any definitely localized tumor present at that time, medical advice having been sought because the girl complained of occasional pain and soreness. I have not been able to obtain any report from the physician who gave the x-ray treatments, but I have a notion treatment was directed to some enlarged lymph-glands of the neck.

Physical examination is practically negative except for the breast condition. There are a few palpable glands in the posterior cervical region on both sides and some small ones in the right supraclavicular fossa, but none in the axillæ. Examination of the breast reveals a firm, freely movable, rather dumbbell-shaped nodule, about 2 cm. to the inner side and a little below the right nipple. The long diameter of the tumor is about 3.5 cm. There is no evidence of any mass in the left breast. This

tumor is not attached to the overlying skin and is not frozen into the breast tissue. The breasts are slightly developed and otherwise of uniform consistency.

This is a very unusual case. The patient has been seen by a very good physician, who told her people that he believed the tumor was malignant and advised radical amputation. Breast tumors in children are so rare that they are not mentioned in most standard text-books on surgery or pediatrics. If our patient were older I would not hesitate to say that this tumor is a fibro-adenoma. In view of the history of some *x*-ray treatments two years ago, it is possible that this lump was present at that time, but not recognized by the mother. If this be true, it is certainly not malignant and probably is a fibro-adenoma. It does not have the characteristic feel of a carcinoma, and I have never seen a carcinoma of the breast in a child so young. A few cases have been reported in children eight to sixteen years of age, although P. W. Phillip did not find a case of mammary cancer under fifteen years among 390 cases of cancer reported as occurring in childhood. From our general knowledge of malignancy in children, one would expect that any sort of a malignant tumor of the breast would be rapidly growing. This conclusion seems to be borne out by the few reported cases of sarcoma of the breast in the literature.

Under gas anesthesia I am making a curved incision over the tumor mass (Fig. 268). Were I certain that this tumor is a fibro-adenoma I might make the usual incision beneath the breast and invert it, so that the scar would not be visible in later life, although this would be difficult on account of the lack of development of the breast. A small incision directly over the tumor is much simpler and will be scarcely noticeable in a few years.

✓ This is not a vascular tumor and is very definitely circumscribed (Fig. 268). I am separating it without difficulty from the surrounding breast tissue, and after clamping the fibrous tissue and blood-vessels at the base, I have removed it in one block. We shall have sections made immediately in order to determine our future course, although I feel certain that we are dealing with a benign neoplasm. In the meantime I shall close

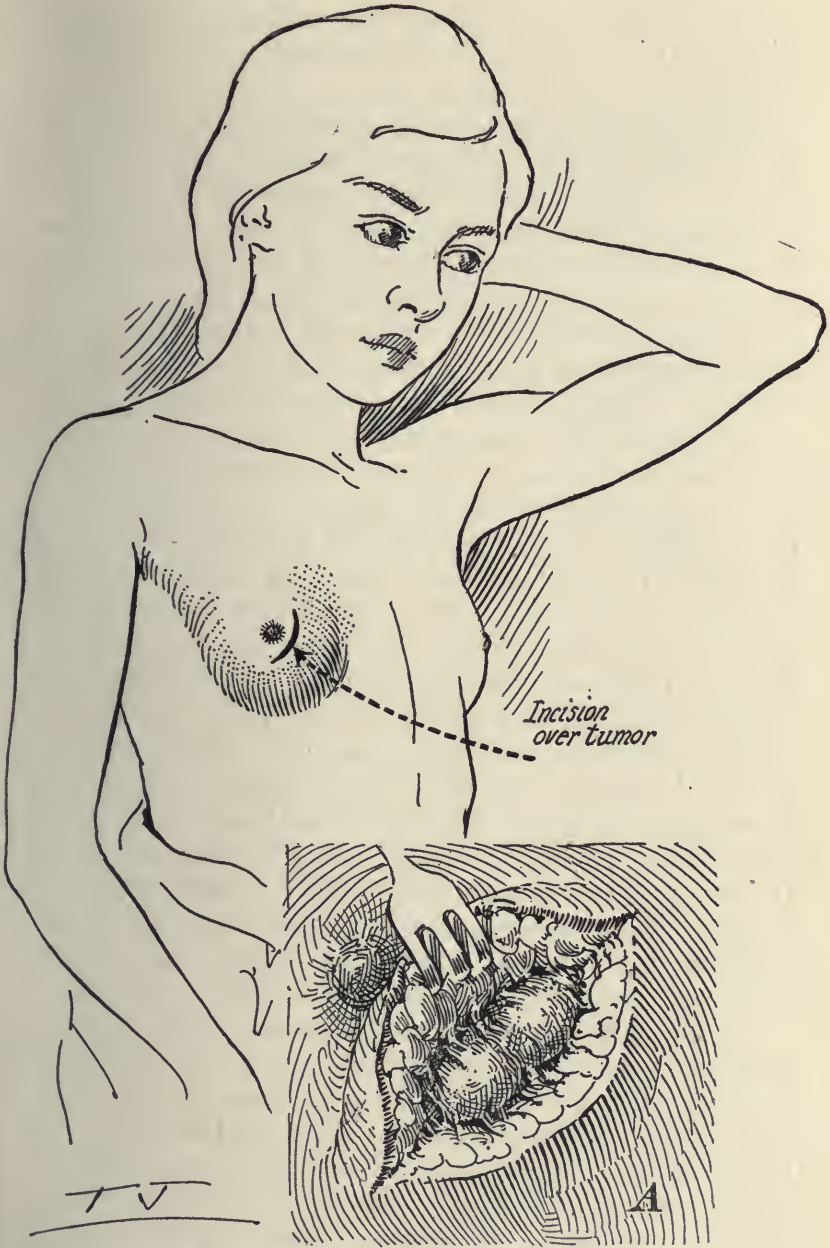


Fig. 268.—Exposure of encapsulated tumor.

the wound with a few interrupted catgut sutures to completely obliterate the dead space, and then approximate the skin edges with interrupted silk.

What other tumors might be considered? Probably one would think first of sarcoma, but this has none of the ear-marks of a sarcoma as we are accustomed to seeing it in adults, that is, this tumor is definitely circumscribed and does not infiltrate. There were no dilated vessels over it. I do not know that the absence of pain is of any diagnostic value, although Rodman reported a case of sarcoma of the breast in a girl of eleven, in which pain was the first symptom. The history is somewhat confusing, but the growth has not been very rapid. While this speaks for benignancy, it might be mentioned that some of the non-malignant tumors of the breast in children have been reported as rapidly growing. A retention cyst might also have been considered before operation, but the unusual shape and hardness of the mass made such a diagnosis highly improbable.

Most tumors of the breast in children are benign. Fibroadenomata are the most common, though Jopson, Speese, and White¹ in 1908 could collect but 13 well-authenticated reports in children under sixteen years of age. To these they added 2 cases of their own. Next in frequency come angiomas, which may be of the skin type or of the deeper variety. The diagnosis is usually self-evident except in the deeper tumors. These may attain considerable size and cause almost complete atrophy of the mammary tissues. They are readily compressible and refill as soon as pressure is relieved. Atkins reported a lipoma weighing 25 pounds, but circumscribed fatty tumors seem to be as rare as sarcomas in the breasts of children.

On section, this tumor is pinkish white and almost uniform in appearance throughout. Grossly, it appears to be a fibroadenoma with a well-defined capsule. Microscopic sections show a marked proliferation of the acini with a tendency to cyst formation. This tumor resembles the picture of a papillary cystadenoma, although I have never heard of this type of tumor occurring in children. Most of them are supposed to be part of the picture of involution cysts of mature women. In discussing

bleeding nipples Dr. Dean Lewis² regarded papillary growths occurring in the acini as essentially the same as those occurring in the ducts. While it has been the general impression that these tumors are all malignant, Dr. Lewis concluded that most of them were not, although some of them unquestionably become so. He therefore advised their removal by a plastic operation.

This tumor was located at the usual site for papillary cystadenomata, that is, just beneath or close to the nipple. As there is no evidence of malignancy I do not feel warranted in advising any further operative interference, although I shall watch with some interest the ultimate outcome of the case.

BIBLIOGRAPHY

1. J. H. Jopson, John Speese, and C. Y. White: Tumors of the Breast in Childhood, *Ann. Surg.*, 1908, xlviii, 662.
2. Dean Lewis: Bleeding Nipples, *Surg., Gyn., and Obst.*, xxii, 666.

ACUTE PANCREATITIS

Summary: Diagnosis of acute pancreatitis. Treatment. Value of cholecystectomy between attacks.

THE patient is an American woman, twenty-eight years old, who was brought into the hospital from an ambulance about half an hour ago. Her present complaint is pain in the epigastrium, nausea, and vomiting. She gives the following very excellent history:

About the middle of November, 1919, while recovering from childbirth, she was suddenly seized with a severe pain in the epigastrium. This was severe enough to double her up and cause her to vomit. She went to bed for an hour or two and then got up in a wheel-chair, the pain having entirely disappeared. Since that time she has had a number of similar attacks, none of which lasted more than thirty minutes. About seventy hours ago the patient was seized with one of her usual attacks of pain, accompanied by considerable vomiting. It did not pass off within a short time as the others had done, although the pain would subside somewhat and then recur with increased severity. She felt quite bloated and uncomfortable. Her physician was called, but owing to the influenza epidemic and because he had previously made a diagnosis of gall-stones, he simply sent some opiate, which relieved her temporarily, and did not see her for about eighteen hours. When he did see her he decided that she had an acute infection of the gall-bladder and decided to treat her palliatively. She lives in a small town which has no hospital, and the facilities for transporting her are not the best. Twelve hours later he saw her again and found that she was in considerable shock; her temperature was nearly 102° F., and her pulse had become quite rapid. He immediately decided to bring her to the hospital, and accordingly she has been transported by train 120 miles on a stretcher.

Physical examination reveals a well-nourished young woman, who is quite evidently acutely ill. By artificial light she does not appear to be jaundiced. Her respirations are labored and rapid and she complains of abdominal pain on attempting to take a deep breath. She is covered with cold perspiration. Her pulse-rate is 130 and temperature 102.4° F. by mouth. It is always well in case any doubt exists to take a rectal admission temperature in such cases, as one frequently finds a normal or subnormal mouth temperature in a patient with considerable fever who has been chilled during transportation in a cold ambulance, or whose mouth is very dry from lack of water during a prolonged journey.

Lungs and heart are negative.

Examination of the abdomen reveals considerable distention. The contour is rounded and there are no visible peristaltic waves. There is marked abdominal rigidity on both sides, but the tenderness is greater in the upper abdomen than in the lower. She co-operates exceptionally well in the examination, and it seems to her that she is not as acutely tender in the region of the gall-bladder as she is a little further to the midline. I have frequently called attention to the importance of having the patient herself localize the most tender spot with one finger. Where the patient will co-operate, this has some decided advantages, as she will not resist her own hand to the extent that she will that of the examining physician, no matter how gentle he may be. She finds that the most tender point is nearly in the midline between the xiphoid and the umbilicus (Fig. 269).

Logically, there are three things to consider: First, of course, is an acutely infected gall-bladder with or without perforation. Her extreme shock and board-like rigidity would make one inclined to the diagnosis of a perforation, providing she is suffering from acute cholecystitis. The second probability is a perforated gastric or duodenal ulcer, in spite of the fact that careful questioning fails to reveal any typical or even suggestive history. Some months ago I showed you a somewhat similar case (*Surgical Clinics of Chicago*, June, 1919, p. 729) in which there was no definite ulcer history and in which I made a diagnosis of per-

forated gall-bladder, but which eventually proved to be a perforated duodenal ulcer. The third probability is that of acute pancreatitis. It is well known that acute cholecystitis predisposes to acute infection of the pancreas, and both are apt to coexist. Opie produced acute pancreatitis in dogs by injecting

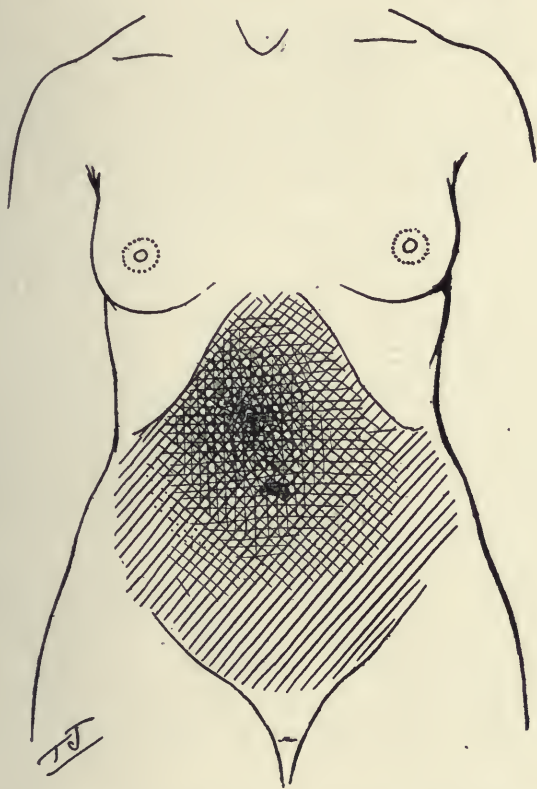


Fig. 269.—Diagram showing relative degree of abdominal tenderness in patient with acute pancreatitis. The region of most marked tenderness is nearly in the midline, midway between xiphoid and umbilicus.

a few cubic centimeters of bile into the pancreatic duct. It is not necessary to presuppose that a stone is lodged in the ampulla to have this regurgitation, nor can we believe that all cases of pancreatitis are produced in this manner. While an infected gall-bladder and stones are present in a majority of cases, both

may be absent and the infection be the result of a hematogenous infection. It has been repeatedly stated that one cannot expect to find sugar in the urine, although it may be present. In this particular instance the urinalysis shows some albumin and Haines' solution is rapidly turned to brick red. Unfortunately, the albumin has not been removed before the test was made, so that the possibility of a reduction from albumin must be considered.¹ From her attending physician I learn that there was no sugar in the urine in November, nor at the time her last child was born. Her leukocyte count is 17,800. It seems to me it is a little low for a general peritonitis from a perforated ulcer of two or three days' duration. The amount of shock, also, is rather out of proportion to this leukocyte count unless the patient is being overwhelmed by her infection and her count is dropping, as it so frequently does a short time *antemortem*. The most likely diagnosis, it seems to me, is acute fulminating pancreatitis. Although this diagnosis is infrequently made, Bloodgood,² in reviewing 11 cases which he has encountered in twenty-five years' experience, states that he believes pancreatitis should be diagnosed clinically. He maintains that the most suggestive sign is the sensitiveness in the epigastrium and the rigidity of the upper portion of both recti.

The patient is now asleep and I am making a high right rectus incision which I can convert into a Bevan S-shaped gall-bladder incision if need arises. On opening the peritoneal cavity considerable brownish turbid fluid escapes, also some fat globules. A piece of omentum comes almost immediately into view. This is studded, as you can see (Fig. 270), with small white plaques which cannot be removed. This is the typical picture of fat necrosis, and one of these plaques alone is sufficient to make the diagnosis of acute or subacute pancreatitis.

How shall we proceed? The gall-bladder, as I had anticipated, is somewhat distended. The walls are not greatly

¹Careful examination of a postoperative specimen of urine showed definitely the presence of sugar, which completely disappeared a few days after operation.

²Bloodgood, J. C.: Acute Pancreatitis Based Upon Personally Observed Cases, Trans. Amer. Gastro.-Ent. Assoc., 180, 1919.

thickened, but I am unable to empty the organ. There are some glands along the gastrohepatic omentum, and I believe that I can feel a stone in the cystic duct. I am searching carefully for a



Fig. 270.—Fat necrosis in case of acute pancreatitis.

stone in the common duct which could dam the bile into the pancreas. I can feel no stones in the common duct. The head of the pancreas is about twice its normal size and very hard. The patient's condition is not such as to warrant any radical

operative procedure. I shall, therefore, drain the gall-bladder as rapidly as possible. I cannot aspirate the contents of the gall-bladder, as they are too thick. On opening the gall-bladder I find that it contains a thick, tarry mucus and bile, in which are floating some soft, yellow stones and some pus. The mucosa of the gall-bladder is very markedly injected. I can now move the stone up from the cystic duct and the bile flows quite freely. The tube which I am inserting into the gall-bladder is rather larger than I usually employ, as I have not made the customary careful attempt to remove all the stones. This tube is held in place by two purse-string sutures, inverting the serous coat around it. I do not feel that I am warranted in doing any further operative procedure.

Moynihan has recommended that the pancreas be incised in all cases of acute pancreatitis. Mikulicz stated that since he had been incising the pancreas in such cases his mortality had been reduced from practically 100 to perhaps 30 per cent. I have not seen a great many cases of acute pancreatitis, but in my experience the mortality has been exceedingly high, no matter what was done. Of course, many of these cases are practically moribund before they come to the surgeon. I shall mop out all the free fluid I can from both the lesser and general peritoneal cavities. There is nothing to be gained by irrigation, and much damage may be done. I hope that the lower abdomen is walled off from the process. Pulling the stomach down, I am making an opening through the gastrohepatic ligament into the lesser peritoneal cavity and am mopping out all the fluid I can. I hope to establish free drainage by introducing one cigarette drain to the foramen of Winslow, by placing a second tube into the kidney pouch below the liver, and a third one through the rent in the gastrohepatic ligament into the lesser peritoneal cavity. Bloodgood drained most of his cases through the gastrocolic omentum, which usually is the easiest method, but as it is possible in this case to go above the stomach, I can bring all my drainage-tubes out at the upper end of my incision. The ideal incision for drainage is a posterior one in the costovertebral angle, but I doubt if the advantage gained in this case would

overbalance the added risk of a prolonged operation. The abdomen is now closed in the usual manner.

The patient has stood the operation very well. Her pulse is still of fair quality and a little less rapid than before operation (120). I shall immediately establish rectal injections of salt solution and give nothing by mouth until vomiting has ceased. I shall encourage the patient to lie upon her right side.

If the patient recovers I shall explain the situation in detail to her, telling her that I should not be at all surprised to hear of her having further gall-stone attacks, as I believe that the majority of cases of acute cholecystitis with stones which are merely drained have a re-formation of gall-stones. Having had one attack of acute pancreatitis, I am inclined to advise the removal of this patient's gall-bladder at the end of a few months' time as a prophylactic measure, regardless of whether she has attacks of pain or not. About two years ago I operated upon a case of acute pancreatitis in which there was a history of a preceding attack six years before. From the patient's description of her first attack it resembled this case very much. There was also the history of a number of gall-stone colic attacks of short duration. It is more than likely that she had acute cholecystitis with pancreatitis at that time and went on to spontaneous recovery, because there were numerous adhesions between the gall-bladder and stomach and the lesser peritoneal cavity seemed to be almost entirely obliterated. I drained the gall-bladder which contained many stones, but the patient died shortly after operation. I feel that the lesson to be deduced from her case is that had the gall-bladder been removed some years previously the fatal attack of pancreatitis would undoubtedly have been avoided.

Postoperative note three weeks after operation: The patient drained profusely for two or three days, the fluid at first being considerably blood tinged and later being almost purely serous. The drains were gradually removed, so that all tubes were out, except the one in the gall-bladder, six days after operation. This tube was allowed to remain for fourteen days. I should have preferred to have left it a little longer, but it came out with

the dressings. I feel that continued drainage in infected gall-bladders is desirable, and I am never in a hurry to remove the tube in cases of this kind. The patient is leaving the hospital today with the wound entirely closed. There has been no discharge of bile for several days. The recovery has been rapid and complete.

TUBERCULOSIS OF THE APPENDIX

Summary: A patient entering hospital with the diagnosis of "chronic appendicitis." Probable diagnosis. Operative findings. Treatment.

THIS patient is a man thirty-nine years old. He is a laborer by occupation. He entered the hospital two days ago with an admitting diagnosis of chronic appendicitis. About five years ago he had an acute attack of pain in the right lower quadrant, which began suddenly about midnight. Shortly after the onset he vomited and the pain became severe. He was confined to his bed for thirteen days at the time and had some fever. Following this he was comparatively free from pain except for occasional twinges, until six months ago, when he became extremely sore in the right lower quadrant and had some cramps, but no nausea or vomiting. He was sick for four or five days, but was not confined to his bed. He does not think he had any fever at that time. He describes his discomfort as more like a boil, that is, it was extremely tender to the touch, but without acute pain. Since then he has never been entirely free from pain, although at no time has it been severe enough to incapacitate him. Except for the fact that he has lost a little weight, his history is negative.

On examination, he does not appear to be acutely ill. His temperature has not been above 99° F. and his leukocyte count is 7000. The heart and lungs are entirely negative. He has marked tenderness over McBurney's point, with a good deal of rigidity on deep palpation. The tenderness is increased by an attempt to flex the thigh. This tenderness and rigidity is not in keeping with a chronic history. He is so tender that I am unable to convince myself that there is a mass present, although there is a sense of resistance which to me is suggestive.

I shall make the usual muscle-splitting incision over McBurney's point. On opening the peritoneum I find no free fluid. I am unable to palpate the appendix, as it is bound down

in a firm mass. I have separated it from the tangling adhesions and can now bring it into view. It is firmly attached to the omentum and it is necessary to remove a portion of the omentum in order to free it. It is most adherent to the ileum and it is necessary to use a good deal of caution to prevent damage to the small bowel (Fig. 271). As I palpate the cecum you can see that this appendix is about as large as my index-finger and approximately 7 cm. in length. It is very firm and has a woody consistency. The cecum is somewhat infiltrated. This is either



Fig. 271.—Enlarged, adherent tuberculous appendix discovered at operation. Note extension of infiltration into wall of cecum at base of appendix.

a case of carcinoma or of tuberculosis of the appendix. I might have suspected an unusual condition, owing to the fact that he has a low leukocyte count (7000) with such marked abdominal findings. There are some glands in the mesentery of the appendix, so that I do not believe, if this is carcinoma, I will accomplish very much by resecting the cecum. As there is no gross evidence of involvement of the cecum other than the local infiltration, I shall simply remove the appendix close to its base in the usual manner, without ligating it. I am inverting a considerable portion of the cecum so as to make sure that I have a

good peritoneal closure. The wound is now closed without drainage.

The differential diagnosis in this case lies between recurrent acute or subacute appendicitis, tuberculosis, and carcinoma. I am rather inclined to believe that we are dealing with tuberculosis of the appendix, although we will have to await the microscopic report before making the final diagnosis. Carcinoma of the appendix always involves the outer or distal third of the appendix, and the glandular involvement is usually considerable before the process has extended as far as the cecum. This is so true that MacCarty has suggested that all appendices be sectioned serially near the tip. In examining a large series in this manner he found a number of entirely unsuspected carcinomas. The diagnosis of carcinoma of the appendix has never been made prior to operation. In the second place, the leukopenia would suggest a tuberculous process. Then, there is the fact that he has had more or less trouble for the past six months without any attack. This might result from some other chronic infection, but carcinoma is usually silent until it gives the symptoms of acute appendicitis.

Tuberculosis of the appendix is a rare condition which is scarcely ever diagnosed before operation. From a statistical study Murphy concluded that 2 per cent. of all appendices removed at operation showed tuberculous lesions, although Deaver only found 15 in 7610 appendectomies (0.2 per cent.). It may be either apparently primary or secondary. Most of the lesions are probably secondary, although a few cases have been reported in which autopsy revealed no other tuberculous process. Such cases are presumably primary and result from ingested bacilli lodging directly in the cess-pool formed by the appendix. It is reasonable to believe that some cases are the result of a hematogenous infection borne from a distant pulmonary focus or from an infected lymph-gland.

Of the three forms of this disease usually recognized, the hyperplastic type is the most rare. The miliary form is not a definite entity, but usually associated with generalized miliary tuberculosis or with tuberculous peritonitis. The ulcerative

type is the most common. Grossly, in this variety, the organ may appear almost normal, but on section, the mucosa is almost entirely absent, due to more or less extensive ulceration. Caseous material may appear on the floor of the ulcers. On section, the mucosa of this appendix is intact. The wall is about 1 cm. in diameter. The muscle coat is whitish and greatly thickened. While microscopic sections are necessary to make a final diagnosis, the history and operative findings all speak for hyperplastic tuberculosis of the appendix.

Note.—Microscopic sections show marked infiltration of the muscularis. There are numerous round cells, an occasional giant cell, and some tendency to tubercle formation, though no typical tubercles are found. This is in accordance with the usual picture of hyperplastic tuberculosis of the appendix.¹

¹Margaret Warwick: Tuberculosis of the Appendix, *Ann. Surg.*, lxxi, 139, 1920.

CLINIC OF DR. EDWARD LOUIS MOORHEAD

MERCY HOSPITAL

FRACTURED RIBS, EMPHYSEMA, POSTERIOR DISLOCATION OF RIGHT HIP-JOINT

Summary: Diagnosis of dislocation of the hip. Mechanism of the production of dislocation and its influence upon the choice of the method of reduction. Results in present case. Management of fractured ribs and emphysema.

THIS case is of interest on account of the severity of the injuries received and the uneventful recovery from them. The history is as follows:

Mr. P. R. is sixty years of age, married, German; occupation laborer. Three weeks ago, while he was employed in loading an elevator with concrete, the bucket or carrier was allowed to descend. The patient was under the impression that the bucket or carrier was at the bottom of the shaft, and he was about to dump the concrete from the wheelbarrow, which he was pushing, into the bucket or carrier, when he was struck by the descending bucket. He was bent over in a crouching position when struck, and his body was crushed between the bucket and the frame of the elevator. He was unable to rise or move and he was assisted by his fellow-workmen, who called an ambulance, and the patient was removed to the hospital.

Upon admission to the hospital the patient complained of severe pain in the right side of the chest. The pain was increased upon deep inspiration. He had pain in the right hip and was unable to move it.

Physical Examination.—The right thigh is flexed, adducted, and inverted until the axis of the femur crosses the lower third of the opposite one; the knee is semiflexed, and the ball of the great toe rests upon the instep of the other foot. The contour of the

hip is altered, the buttock is flattened and broader than the other, the gluteal fold is raised, and the trochanter more prominent; it rises above Nelaton's line, and approaches the anterior superior spine. The limb is shortened about 3 inches. Upon deep pressure the head of the femur may be felt when attempts are made to rotate the limb from side to side; in front, the hollow left by the displacement of the head can be readily appreciated by the examining fingers. The knee and hip are flexed, so that the sole of the foot rests on the bed by the side of the other knee, and by passive motion it is found impossible to evert the limb; the opposite side of the pelvis rises at once. Voluntary movements are very much restricted; of passive ones, flexion is the least affected; the limb cannot be completely extended, and abduction, adduction, and rotation are all limited.

Pain is very severe and extends down the limb, and upon attempts to extend the limb the back becomes arched.

Chest.—Over the entire right side of the chest, extending from above the clavicle almost down to the crest of the ilium, there is marked subcutaneous emphysema. Respiratory movements are painful and limited. Upon palpation and also auscultation crepitus can be determined over the third, fourth, fifth, and sixth ribs in the axillary line. The patient has the inclination to cough, but it increases his pain so much he tries to restrain himself. There is apparently no blood in the expectoration.

Heart tones are normal; no murmurs.

Urinalysis: Specific gravity, 1028; albumin, trace; sugar, none; white blood-cells, few; red blood cells, none; rarely finely granular casts.

Radiograms show a superior posterior dislocation of right hip-joint (Fig. 272). Stereoradiograms show a fracture of the second, third, fourth, fifth, sixth, and seventh ribs near the curvature in the right side (Fig. 273).

The diagnosis of the conditions with which we had to deal in this case were therefore fractured ribs and resultant emphysema from puncture of the lung and superior posterior dislocation of the right hip-joint.

Treatment.—In the treatment of dislocations of the hip-

joint it is well to keep in mind the mechanism of dislocations. Except perhaps in pubic dislocation, which may be produced in extension, the limb is always flexed. If it is flexed and adducted, the head of the bone is driven directly through a tolerably strong



Fig. 272.—Tracing of roentgenogram and sketch illustrating posterior superior dislocation of hip.

part of the capsule on to the ilium or ischium; if it is flexed and abducted, the edge of the acetabulum acts as the fulcrum of a lever, the head is tilted out from its socket and slips through where the fibers are thinnest, at the lower and inner margins. Then it becomes displaced secondarily, either backward or for-

ward, by the weight of the limb and the contraction of the muscles. The shape of the acetabulum favors the latter; the upper and back part of the cavity is of immense strength and



Fig. 273.—Roentgenogram of right side of chest; arrows indicate site of fractures of the third, fourth, fifth, sixth, and seventh ribs.

very deep; the inner, on the other hand, is low and interrupted for nearly an inch by the cotyloid notch. In abduction the head of the bone rolls more and more toward this side until it projects

above the edge, half resting against the weakest portion of the capsule. In this position a very slight push is sufficient to tear the thin membrane across, and, the round ligament being relaxed, to dislocate the head of the bone. Its ultimate resting place is determined by the degree of flexion and rotation. Sometimes it moves slightly inward and remains in the thyroid foramen. Very rarely, only indeed when the limb is everted and extended, it ascends on to the pubes. Much more often, owing to the inversion of the head, it forces its way backward, below the tendon of the obturator internus, and either remains upon some part of the ischium, or, if the capsule and the short external rotation muscles are badly torn, makes its way higher up until it lies upon the dorsum. The backward dislocation is the most common, and includes both the dorsal and the sciatic varieties; they are produced by the same kind of accident; the attitude of the limb is the same, although it varies in degree; and the method of reduction is the same. The difference depends upon the position of the rent in the capsule and the extent of the injury to the muscles. If the opening is high up, the displacement is dorsal from the first; if the lower part is torn, it is sciatic; but if the rent is large and the short external rotators are much lacerated, the head of the bone ploughs its way up subsequently, and the sciatic dislocation becomes dorsal by secondary displacement. Dislocation backward is always caused by flexion, and unless everything that resists is torn across, can only be produced by flexion. The thigh is bent at the moment of the accident, generally to its fullest extent, whatever attitude it assumes afterward, and the first thing to do is to restore it to this position, so as to bring the head of the bone opposite the rent through which it escaped. The knee must be flexed to relax the hamstrings and the sciatic nerve; and then the hip, until the front of the thigh is pressed against the abdomen. The ileofemoral band is relaxed by this, the femur is brought into proper line, the inversion ceases because now there is no tension on the external limb of the Y ligament, and the head of the bone is lifted out from between the rotator muscles until it rests upon the margin of the acetabulum. Sometimes a little adduction or rotation inward

helps to push the tendons aside. If now the pelvis is held down by pressure upon the ilia, and the knee is lifted vertically upward, in many cases the head of the bone slips at once over the rim into its socket. The amount of force employed varies. In this case it required considerable. Of course, you understand, the reduction was accomplished under general anesthesia, which should, as a rule, be employed. Sometimes this procedure does not succeed, and there is a mechanical reason for it. The neck of the bone may be entangled in the obturator internus tendon; or the sciatic nerve, or the tendon of obturator externus may be twisted around it; the rent in the capsule may be more to one side; or a portion of muscle or of the capsule may constantly get in the way and partly fill the cavity. Whatever it is, an attempt must be made by rotating the limb from side to side, and by abducting and adducting it, to stretch the opening and disengage the head.

If the head of the bone cannot be lifted directly into its socket, try and tilt it in by turning the femur into a lever. The base of the neck is fixed by the Y-shaped ligament, and forms the fulcrum; the limb is the long arm, and the head the short one, so that the power is great. The thigh is flexed as before, but slightly abducted; this brings the head a little toward the inner side of the cup, where the brim is lowest, and helps also to stretch the opening in the capsule. Then, if it is rotated outward and extended, the iliofemoral band is tightened up and the head is forced to travel round the cavity until it reaches the lowest part of the rim, over which it rolls at once.

During the first part of the manipulation the thigh should be forced down upon the abdomen, as the object is to raise the head from among the muscles; but when the limb is being rotated, as a preliminary to extension, it should be held at right angles to the body; if it is more flexed than this, or if it is much abducted, the head of the bone, when the limb descends, slips to the inner side of the acetabulum, instead of rising over the edge, and the dislocation becomes thyroid.

Sometimes the iliofemoral ligament is partly torn, so that the fulcrum is not held firm, or a fold of the capsule gets in the way, or

the head is so surrounded and button-holed that it cannot be released, and then extension is the only thing left; but, as a rule, in these circumstances the parts are so torn (to some extent by the manipulations) that it can be done by the hands at once, or a jack-towel and pulleys are not required.

The treatment employed for the fractured ribs was strapping the entire right side of the chest with adhesive plaster straps. The adhesive is applied during expiration, thereby making a firm dressing and limiting the respiratory movements of that side.

The emphysema was due, no doubt, to a puncture of the lung, probably at a point where it was adherent to the pleura.

The convalescence of this patient has been uneventful. For the first two days following the anesthetic there was a slight elevation of temperature (100° F.). Since then the temperature and pulse have remained practically normal.

The emphysema has gradually disappeared, and now there is very little evidence of any remaining.

There is a slight cough occasionally, and a little pain in the right side of the chest upon deep inspiration. The fractured ribs are fairly well united. The patient walks without any pain or discomfort in the right hip-joint; in fact, he has not complained of much pain in the hip-joint since the dislocation was reduced. This is accounted for by the fact that the dislocation was reduced about three hours after it was produced. It is very gratifying to see the manner in which the chest condition has cleared, and no doubt this is due, in a measure, to the early attention given the case. It is now three weeks since the injuries were received and the patient is now ready to leave the hospital. After a rest of two or three weeks he will probably be able to resume his work.

OBSTRUCTION OF THE SIGMOID WITH A PALPABLE ABDOMINAL MASS

Summary: Causes of colonic obstruction—probable diagnosis in present case. Methods of study. Discovery at operation of kink, due to adherent omentum.

MRS. Y. is thirty-six years of age. She is referred to me by Dr. Clark, who gives the following history:

Four months ago the patient was operated upon by him for the removal of an ovarian cyst in the left side. At the same time, he states, he removed the vermiform appendix and shortened the round ligaments of the uterus. The patient's convalescence was uneventful, and she made a prompt recovery and resumed her household duties. At the time of the operation the doctor states that the abdominal viscera, otherwise than those previously mentioned, were normal.

Menstrual History.—Began at eleven years, regular, and not attended by much pain or discomfort.

She is the mother of 6 children; she has had one miscarriage.

There is no history of previous illness and no history of tuberculosis or carcinoma in her family.

Present complaint began six weeks ago. Patient states that her illness began with severe cramps followed by diarrhea. There were ten to twelve bowel movements daily, and always preceded and followed by severe cramps. There has been a loss of about 12 pounds in weight. Her appetite is poor.

Physical examination reveals a poorly nourished female about thirty-six years of age. Head and neck are negative.

Heart.—Cardiac dulness is normal; there are no murmurs.

Chest.—A few disseminated râles are heard over the left side of the chest.

Abdomen.—In the lower left quadrant of the abdomen there is found a tumor mass about $2\frac{1}{2}$ inches in diameter. This mass is

quite painful to touch and is but slightly movable, apparently being attached to or in some way involving the large bowel.

There is no adenopathy.



Fig. 274.—Roentgenogram (retouched) taken following barium enema; note apparent obstruction at junction of sigmoid and descending colon. The omentum is indicated in the position in which it was found at operation.

Bimanual examination shows the uterus somewhat fixed in anterior position. The tumor mass can be felt and its attachments are apparently to the large bowel.

Urinalysis.—Specific gravity 1010; reaction neutral; albumin, trace; white blood-cells, many; sugar, none; red blood-cells, few.

Examination of the blood shows 3,587,600 erythrocytes,

11,250 leukocytes, and 55 per cent. hemoglobin. Differential count shows rarely a poikilocyte and macrocyte.

The results of chemical examination of the feces for blood are strongly positive.



Fig. 275.—Roentgenogram (retouched) taken twenty-four hours after a barium meal; note filling defect and obstruction apparently confirmatory of findings by barium enema (Fig. 274).

The Wassermann test is negative.

In these cases much may be learned by a fluoroscopic examination of the large bowel, and we make it a routine procedure. The report of the radiologist, J. B. Zingrone, is as follows:

Intestine.—The fluoroscopic examination, made by means of

the barium enema, showed the emulsion entering the sigmoid flexure rather freely. However, the flexure was markedly displaced to the right, and the emulsion did not pass beyond the upper end of the sigmoid flexure. This was due to the abdominal mass and the incompetency of the rectal muscles. Radiograms taken immediately after the fluoroscopy are confirmatory of the fluoroscopic findings (Fig. 274). Radiograms taken twenty-four hours after the barium meal show the emulsion divided, 50 per cent. in the ascending colon and 50 per cent. in the descending colon near the sigmoid flexure. The descending colon shows a marked filling defect at the junction with the sigmoid (Fig. 275). This defect is suggestive of malignancy in the descending colon.

The day following the barium meal there was profuse diarrhea and the tumor mass diminished slightly in size, no doubt as a result of a previous fecal impaction at that point.

Operation.—The patient has received the usual preparation for operation. We will do this operation under ether anesthesia. The incision at the previous operation was a left rectus one, and we will follow the same line, removing the old scar. As to what we are going to find in this case, the nature of the tumor mass which is giving rise to obstruction of the sigmoid, there is a question whether it arises from within the lumen of the bowel or from without. Again, is it due to a new growth or to an inflammatory process? The radiologist's report in conjunction with the rapid emaciation of the patient, the pain and fixidity of the growth, would lead one to suspect malignancy. However, the history of the apparently normal condition of the abdominal viscera at the time of the previous operation, and bearing in mind that there was more or less traumatism to the abdominal viscera at that time, and the possibility of raw or denuded surfaces being left, one must not lose sight of the probability of an inflammatory process with resultant adhesions.

The abdomen is now open and we come at once in contact with extensive adhesions of the omentum and intestines. The omentum is drawn to the left side and firmly adherent. A loop of small intestine is adherent to the posterior surface of the uterus. This is carefully separated. The omentum is firmly attached

to the left side of the uterus and stump of broad ligament, where the ovarian cyst was removed. By gradually separating the omentum we finally come to the point where the tumor mass is located, and find it to be the omentum surrounding the sigmoid and holding it in an angulated position, greatly diminishing the lumen of the bowel at the point of angulation. The omentum is separated with some difficulty, all bleeding points ligated, and raw surfaces covered over as well as possible. This leaves the sigmoid free and its lumen restored to normal size. The omentum is now spread out evenly and smoothly and the abdominal wound closed in the usual manner.

As for the postoperative treatment in this case, we believe the best plan to follow will be to give the patient a good dose of castor oil thirty-six to forty-eight hours following operation, to have the bowels move freely, to stimulate rather than inhibit peristalsis, and in this way, at least in a measure, guard against the formation of new adhesions.

Note.—Patient made an uneventful recovery. She left the hospital at the end of four weeks. There was no further difficulty with the bowels. Reported at the end of two months, when general condition was improved and she had gained in weight.

UNDESCENDED TESTICLE: INGUINAL HERNIA

Summary: Pathologic anatomy and embryology of undescended testicle. Indications for treatment. Methods of operation. Superiority of the Bevan technic. Average results.

MR. A. M., sixteen years of age, an American student, comes for the relief of a swelling in the right inguinal region. He states that the right side of the scrotum has always been much smaller than the left. He does not know whether or not the testicle was ever present in the right side of the scrotum. His father is unable to enlighten us on the subject.

Two months ago, while playing football, he was knocked down and received an injury in the region of the right groin. The parts became very much swollen and painful. He was kept in bed for three weeks, and since that time has suffered from pain, discomfort, and a swelling in the right inguinal region. The attendant at the school in which the patient was a student advised that he have an operation for hernia, and his father has brought him here for that purpose.

Physical Examination.—The patient is a well-nourished and well-developed young man about sixteen years of age. There is nothing abnormal found in the physical examination of the patient except this swelling in the right inguinal region. The swelling presents at the external abdominal ring. The external portion is soft and apparently contains fluid. Higher up in the inguinal canal there is a firmer mass, tender to the touch and but slightly movable. This firmer mass is, no doubt, the testicle. There is an impulse felt over the swelling on coughing. The diagnosis is quite clear—an undescended testicle complicated by a hernia. This condition has been further complicated by the traumatism received, resulting in an inflammatory process, which has left the testicle in a fixed position in the inguinal canal.

The testicle in early fetal life is developed in the abdominal cavity from the tissues of the genital ridge, and afterward

becomes connected with certain of the tubules of the Wolffian body (epididymis). It lies behind the peritoneum, in front and a little below the kidney. The anterior surface and sides are invested by peritoneum. The blood-vessels and efferent ducts are connected with its posterior surface; attached to its lower end is a peculiar structure—the gubernaculum testis. Some of the fibers of this structure are attached to the internal abdominal ring, some to the spine of the pubis, and others to the bottom of the scrotum. Traction upon the testicle by this structure is considered one of the main factors in its descent; however, other agencies are believed by many to play an important part. The testicle may remain in its original position, or be arrested at either of the points of attachment of the gubernaculum—the external abdominal rings.

Indications for Operation.—Every undescended testicle is accompanied by a hernia, either actual or potential, and is more subject to trauma than the normally situated testicle.

Restoration of the spermatogenetic function of the testicle by its replacement within the scrotum is claimed by some, but while this does not appear very probable, it is an argument in favor of operative replacement. The not infrequently observed development of malignant tumors in undescended testicles, or the possibility of an extension of a gonorrhea, or its metastatic involvement in mumps, are all possible conditions which may be considered as indications for operative measures.

Treatment.—Various methods have been used in the treatment of undescended testicle: (1) The use of the forked truss (Langenbeck's); (2) orchidectomy; (3) replacement of the testicle within the abdomen, with closure of the internal inguinal ring, probably curing the hernia, but not obviating the other dangers associated with a non-descended testicle; (4) the abolition of the open tunica vaginalis, by dividing the tunica at the internal ring, forming a new tunica vaginalis from the distal part and anchoring the testicle to the bottom of the scrotum by sutures. This method is applicable only to mild cases, in which the testicle is very close to the scrotum, because if there is any tension upon the cord either the testicle will tear loose from its anchorage in the

scrotum and retract to its original position, or if the anchorage holds, the scrotum gives way and is invaginated and pulled up by the retracting testicle.

Attempts have been made to overcome these objections by suturing the fascial structures of the cord to the pillars of the external ring; incising the septum scroti and suturing the undescended testicle to its fellow of the opposite side; anchoring the testicle to the bottom of the scrotum by sutures passed through the latter and tied over an external pledget of gauze. Sutures are sometimes passed through the testicle, then passed through the scrotum, left long, and fastened to a wire cage or to the thigh; the principle being that the continuous traction would so lengthen the cord that upon removal of the sutures the testicle would stay within the scrotum (Lunz operation). A small incision is made in the bottom of the scrotum through which the testicle is extruded. The incision is closed snugly, leaving the testicle outside, the idea being to leave it there until adhesions have formed, whereupon the incision is reopened and the testicle replaced. Starr fastens the testicle to a wire splint, which is fixed at one end to the pubic bone and at the other end to the scrotum.

The Kelly-Torek is a rather complicated operation. Essentially it consists in an incision in the bottom of the scrotum through which the testicle is extruded. At a properly selected place an incision is made upon the thigh down to the fascia. The testicle is fastened to this structure, and the scrotal flaps are sutured to the flaps of the incision on the thigh. At a second operation, three months or more later, the scrotum and testicle are liberated from the thigh, and the testicle is replaced within the scrotum, the principle of the operation being that long-continued fixation of the testicle to the thigh lengthens the cord.

Kirschner's Operation.—A sort of a bell-shaped receptacle is made for the testicle from a piece of fascia lata of the patient, and this is passed through a subcutaneous tunnel and is fastened to the superficial perineal fascia.

Probably the most satisfactory procedure and the one which we shall endeavor to follow in this case is that described by

Bevan. The cutaneous incision is like that for the radical cure of inguinal hernia. The aponeurosis of the external oblique is

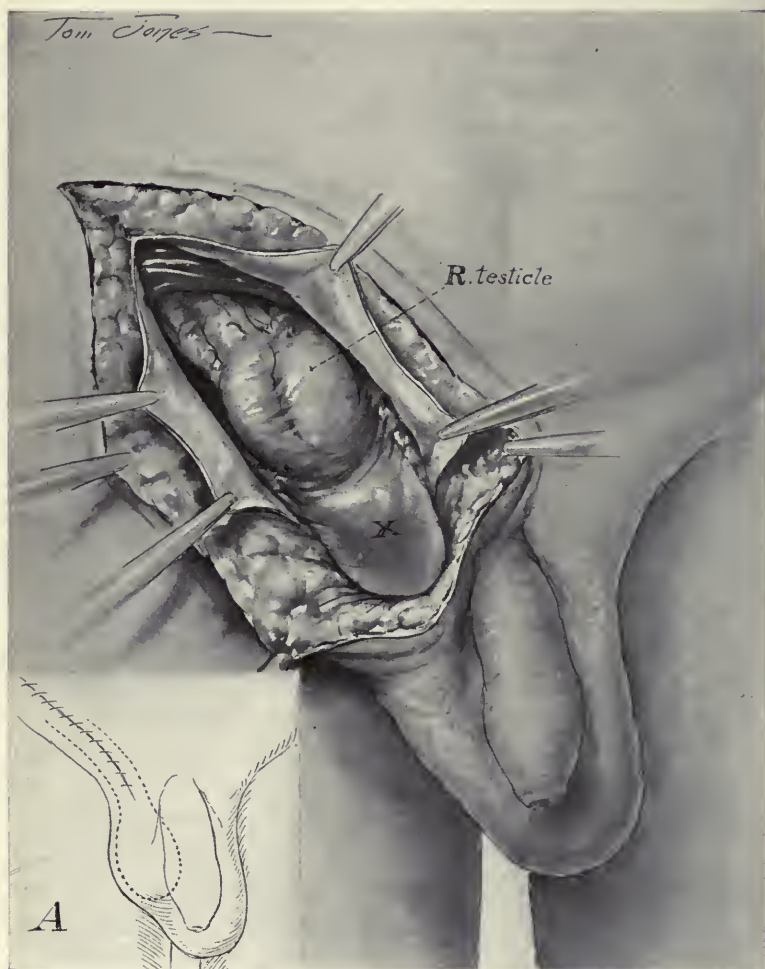


Fig. 276.—Inguinal canal split open exposing undescended testicle lying in hernial sac, X (unobliterated tunica vaginalis testis), which extends a short distance beyond the testicle into the scrotum.

split in the direction of its fibers. Retraction of the lower flap exposes Poupart's ligament (Fig. 276). The hernial sac, which

contains a quantity of fluid, is now isolated and freed from the spermatic cord. The sac is very thin and the cord is spread out fan-shaped over the sac. The isolation of the sac is begun at the neck, and when this is completed, the peritoneal cavity is closed either by transfixion and ligation or by a purse-string suture. The distal part of the sac may either be cut off close to its attachment to the testicle, or it may be cut off at some distance from the testicle and a new tunica vaginalis constructed, or it may be everted and sutured as in the operation for hydrocele. In this case the first method is used.

The liberation of the vas deferens from the sac must be carried out very carefully. The vas deferens must not be pinched by forceps or handled roughly, as the ultimate viability of the testicle depends upon the small artery of the vas, and if this is injured or becomes thrombosed, there is a grave danger of subsequent necrosis of the testicle.

Examining the parts now, there are seen the vas deferens, its vessels, and the spermatic vessels diverging as they enter the inguinal ring, the former going downward and inward, toward the bladder, and the latter almost directly upward and slightly inward.

The testicle, which is found slightly adherent (no doubt as a result of traumatism), is freed from its adhesions, and now we will try to determine whether or not the cord will permit transplantation of the testicle. It will be necessary to free the vessels of all extrinsic fascial structures by tearing and occasional snips with the scissors in order to bring the testicle down. In many cases of high inguinal or abdominal retention this procedure is not sufficient and a still more radical step becomes necessary in order to permit of transplantation of the testicle into the scrotum without tension. The vas deferens is carefully held out of the way of injury, and the remainder of the component parts of the cord—*i. e.*, the spermatic artery and veins—are completely divided between two ligatures, and the intervening piece resected. When this has been accomplished the testicle can be brought down with ease. The scrotum is now stretched with a dressing forceps for the accommodation of the testicle. Into

this pocket the testicle is placed without any anchorage, and in order to prevent any luxation the neck of the scrotum is closed by an interrupted suture. The testicle comes down into the scrotum without any traction on the cord. This side of the scrotum is not as deep as the other side. The operation for the radical cure of the hernia is now completed, following the method of Andrews without transplantation of the cord.

The postoperative course of these cases is usually that of uncomplicated hernia, with the exception that not infrequently on the second or third day after operation more or less exudate occurs around the testicle and the scrotum becomes swollen and ecchymotic. This may be due to infarction, thrombosis, or to a diminished return of blood. Under the application of the hot-water-bag or the ice-bag this exudation quickly becomes absorbed.

Bevan based his operation upon a close study of the blood-supply of the testicle, and upon the important discovery that the inability to bring the testicle down into the scrotum is due to the shortness of the vessels of the cord. The former belief that the spermatic artery is a terminal artery and the sole arterial supply of the testicle has been proved erroneous. The testicle has an additional blood-supply from the artery of the vas deferens, usually a branch of one of the vesical arteries.

The results in those cases in which the testicle can be transplanted without division of the spermatic vessels are good. The primary results in cases in which the spermatic vessels are cut are usually good. The hernia is cured. In some cases after a lapse of time there may be a diminution in the size of the transplanted testicle.

CLINIC OF DRS. GUSTAV KOLISCHER AND
J. S. EISENSTAEDT

MICHAEL REESE HOSPITAL

PAPILLOMA OF THE BLADDER

Summary: Removal of vesical papillomas through a suprapubic incision by cautery. Closure of bladder without drainage. Technic of closure of abdominal incision—importance of adequate subfascial drainage.

THE first patient is a man fifty-three years of age. He states that for the past four years he has noticed a sensation of fulness in the bladder region and that the urine has occasionally been distinctly colored with blood. There has never been any pain in the bladder region and he does not have to get up at night to void urine.

Cystoscopic examination is readily accomplished, there being no obstruction. Two papillomatous tumors are seen projecting into the bladder cavity. One in the left lower quadrant appears to have the size of a large chestnut. It projects over its base in a cauliflower-like manner and covers the left ureteral orifice. By toppling it over with a ureteral catheter we are able to see its base and the character of implantation. The tumor is pedunculated, having a rather thick pedicle, around the base of which are seen many engorged, tortuous blood-vessels, and some edema. The second tumor is implanted in the right upper quadrant, is smaller, and depends into the vesical cavity. The pedicle is likewise rather dense.

Our choice of the method for the removal of these tumors will be determined by the following considerations: Fulguration is not to be advised, first, because the high-frequency spark is not adequate to destroy tumors of such dense structure, especially those which already show disturbances in their circulation, as the tumors now under consideration; second, on account of the danger of exciting more rapid proliferation of the growth, and occasioning early and extensive recurrences. Infection with subsequent peritonitis is a third danger to be taken into consideration.

The destruction of this tumor with a galvanocautery employed through the operating cystoscope does not offer good prospect of cure because of its size and consistency, and also on account of the location of the tumor in the right upper quadrant, which with the instruments thus far available cannot be properly approached. We shall, therefore, resort to the open route, thus ensuring complete destruction of both growths in one operation, and we shall completely close the bladder after the destruction of the tumor is accomplished, thus eliminating all the inconveniences of siphon drainage of the bladder. Our choice of a method of destroying these tumors by heat is determined by the now proved fact, at least in our opinion, that by this means the results, both immediate and remote, are distinctly superior to excision of such tumors by knife or scissors.

Operation.—A Barnes bag is inserted into the rectum and distended with water. This brings the base of the bladder into a more accessible position for any type of interference. The bladder is then filled with about 150 c.c. of a 2 per cent. protargol solution. The catheter is later utilized to test the bladder suture after operation. The patient is then anesthetized and placed in a moderate Trendelenburg position, which also aids the satisfactory exposure of the base of the bladder. The bladder is opened in the usual way and fiber retractors are inserted; this material is chosen in order to protect the bladder wall from the heat of the cautery. By inserting retractors in the lower and upper angles of the wound with traction in the occipitocaudal direction the lower tumor is properly exposed (Fig. 277). Now the tumor is burned down with a heavy galvanocautery. The cauterization is continued until the tumor and its base are transformed into a homogeneous, dry, black crust.

A lateral retractor is now inserted in order to expose the upper tumor, and the same procedure is carried out. We proceed now to close the bladder. The success of suturing bladder wounds depends on two factors—the apposition of rather broad raw surfaces and the avoidance of impaction of the vesical mucosa between the edges of the wound. A continuous stitch of the Cushing type is employed to bring about good apposition

(Fig. 278, 1). The insertion of the needle at an appreciable distance from the edges insures inversion of the free borders of the mucosa. Following this a simple running suture is whipped over the suture line in order to reinforce it and ensure the tightness of the closure (Fig. 278, 2). By injecting some fluid through



Fig. 277.—Exposure of interior of bladder through suprapubic incision. Note papilloma on bladder wall.

the catheter the adequacy of the sutures is tested, and leaking points, if discovered, are closed by additional stitches. As the next step, a few heavy tension sutures are placed, passing through the skin and fascia, and embracing also the bellies of the recti muscles. Underneath the fascia of the recti a narrow, fenestrated rubber tube is placed parallel to the incision, both ends of the

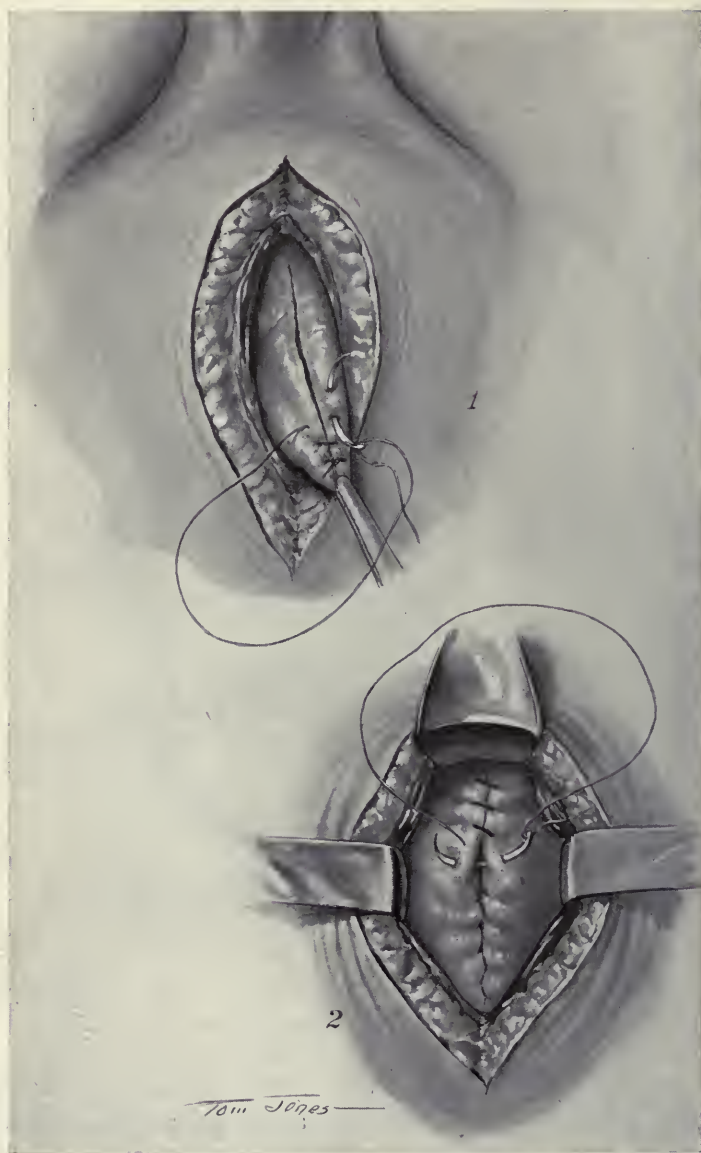


Fig. 278.—Closure of incision in bladder. 1, First layer of sutures by method of Cushing. 2, Second suture layer by method of Lembert.

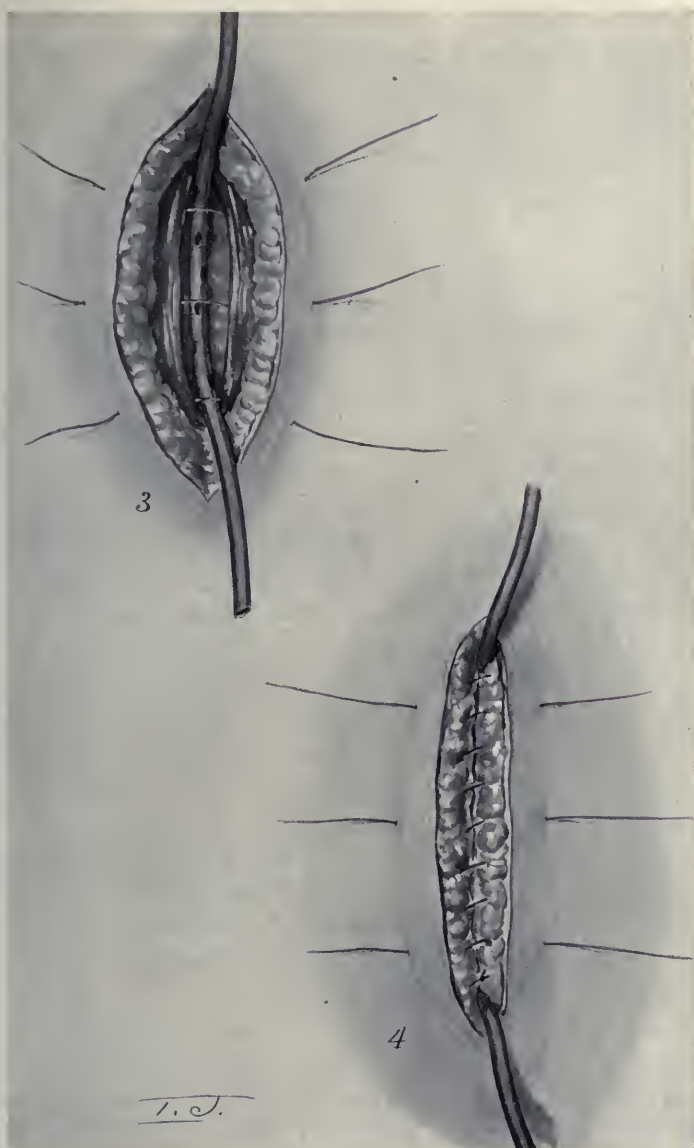


Fig. 279.—3 and 4, Adequate method of subfacial drainage which permits primary closure of bladder incision.

tube being brought to the surface of the wound (Fig. 279, 3, 4). The fascia is now reunited by a running catgut suture. Subfascial drainage of this kind is the best guarantee for final undisturbed healing of the entire wound. If infection should occur and exudation follow, the insertion of one or two tubes at right angles to the suture line avails but little. The inner ends of such tubes are soon walled off by the inflammatory swelling and retention and finally sloughing of the fascia will result, an incident of far-reaching consequence. Even if cystitis is present the vesical suture as above carried out will hold if the upper layers are properly drained. The skin edges are now closed with metal clips and the tension sutures are tied over a gauze roll. The catheter is now removed, the rubber bag deflated and withdrawn, the wound covered with dry dressings, and the patient returned to his bed.

The patient either urinates naturally or is catheterized at regular intervals, the length of which depends on the activity of the kidneys as well as upon the irritability of the bladder. The insertion of a permanent catheter is not advisable on account of the danger of setting up urethritis, peri-urethritis, and unnecessary and irksome irritation of the bladder.

The urine is kept highly acid by oral administration of mineral acids, an acid urine being antagonistic to the invasion and proliferation of pathogenic bacteria.

The tension sutures are removed on the fourth day, the skin-clips on the sixth day. During the first days the patient will show elevation of temperature due to absorption of exudate formed under the eschar. As soon as the crust becomes loosened absorption and consequent fever subside.

If the galvanocautery is used, the crust, as a rule, is shed inside of a week, while the eschar produced by diathermy takes more time to slough. In either case the throwing off of this crust is evidenced by the turbidity of the urine, which clears up again as soon as this process is complete. In either instance the resulting granulating surface becomes rapidly epithelialized and a cystoscopic examination undertaken two weeks after the operation will, as a rule, demonstrate quite normal conditions.

MUSCLE-SPLITTING INCISION FOR EXPOSURE OF KIDNEY

Summary: Dislocation of kidney with symptoms as a result of chronic perinephritis. Indications for operation. Technic of the muscle-splitting incision—its advantages.

THIS patient is a woman of thirty years, who some years ago experienced several local infections, tonsillitis, mandibular abscess, and appendicitis.

For the past two years she has complained of increased frequency of urination, occasional pain in the right renal region, and gastric disturbances. These latter symptoms have increased in intensity and frequency during the last six months.

The patient is very lean and palpation is readily and satisfactorily carried out. The right kidney region appears to be empty. Deep pressure on the gastric region produces the same kind of a pain which the patient senses on deep palpation of the left kidney area.

The urine shows a few leukocytes and occasional hyaline casts; its chemical qualities are normal.

Cystoscopy reveals no pathology.

The roentgenogram shows the left kidney in normal position. The shadow of the right kidney is moved toward the center of the body, lying partially over the vertebral column. This dislocation of the kidney is further emphasized by the direction of the shadowgraph catheter, which in its upper course sweeps in a wide curve and ends close to the vertebral column.

Apparently we have to deal here with the result of a perinephritic process starting in infection of the fatty capsule, secondary to the various focal infections experienced, causing the formation of dense adhesions which have pulled the kidney out of its niche and fastened it in an abnormal position. The patient is anxious to be relieved from these periods of suffering.

Experience teaches that dislocation of the kidney and cicatricial transformation of the fatty capsule quite often will interfere

with the blood-supply to such an extent that pronounced clinical symptoms result, although no mechanical obstruction of the ureter can be detected. We therefore have decided to expose the kidney, loosen it from the strangling adhesions, and replace it in its normal surroundings. It is quite evident that the steps necessary for exposing the kidney should not occasion any destruction of the tissues overlying it, and we therefore will try to exhibit the kidney by a gridiron operation.

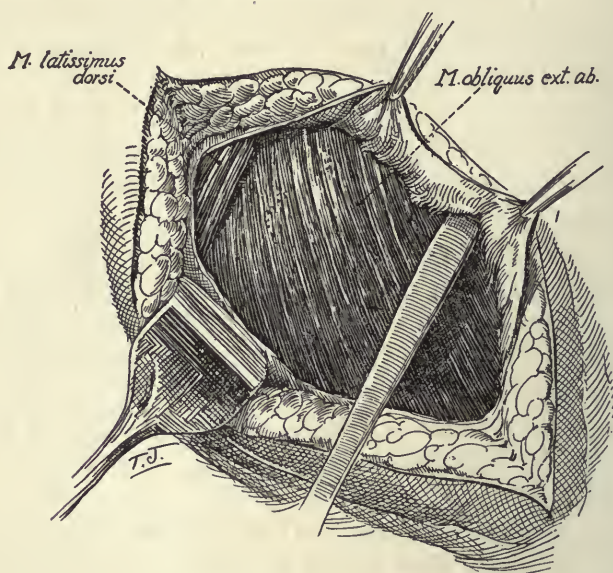


Fig. 280.—Incision through skin and superficial fascia; deep fascia is dissected back on each side for 5 or 6 cm.

Our incision is placed midway between the iliac crest and the last rib, beginning at the anterior edge of the latissimus dorsi, running parallel to the last rib with a slight slant downward from the costal arch. This incision is deepened until not only the subcutaneous fat but also the fascia covering the muscles is severed. Then the upper and lower edges of the incision are undermined by stripping off the fascia from the muscle to the extent of 5 or 6 cm. (Fig. 280). In this way the external oblique is freely exposed. Now we separate its fibers in the center of the

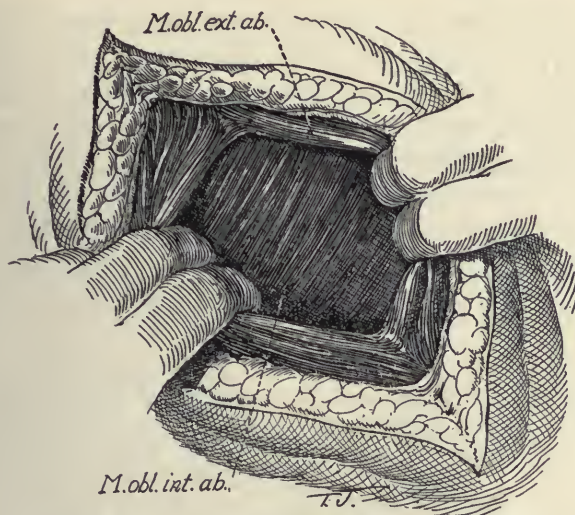


Fig. 281.—Separation of fibers of external oblique.

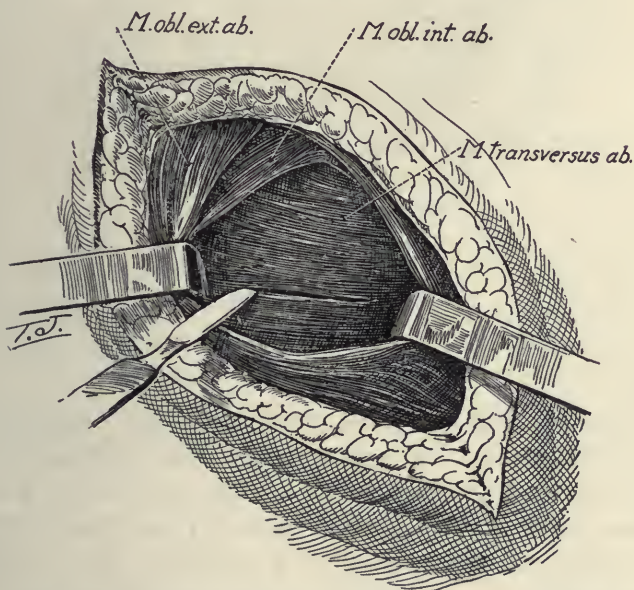


Fig. 282.—Exposure of and incision in transversalis muscle.

muscle by forcing them apart by blunt dissection (Fig. 281). Retractors inserted in this gap expose the underlying internal

oblique, the center of which is divided by blunt dissection. Reaction reveals the fascia of the transversalis which is split in its central part by a longitudinal incision (Fig. 282). The muscle thus exposed is now penetrated by separating its central fibers. We now insert large retractors into the muscular and fascial gap, and by steadily pulling on them sufficient space is gained for the freeing and delivery of the kidney (Figs. 283, 284).

With the *x*-ray pictures before us we will now palpate the kidney and carefully and gradually begin to bring it out of its



Fig. 283.—Exposure and delivery of kidney.

fatty capsule. The capsule is rather dense and permeated by many fibrous strands. Wherever we encounter resistant strands, they are severed between double ligatures in order to prevent any hemorrhage, which may interfere with the orderly procedure of the operation. After the kidney is completely freed the pelvis and parenchyma are scrutinized, and as no visible pathology can be found, it is dropped back into its niche.

Inspection of the incision shows very simple conditions. The slits in the muscles close spontaneously. All that is necessary

now is to close the separation of the transverse fascia with a running gut suture. A few heavy tension sutures are now placed, the table is let down, and the operation is finished by sewing up the fascia of the external oblique and by closing the skin. Exposure of the kidney in the way described offers the following

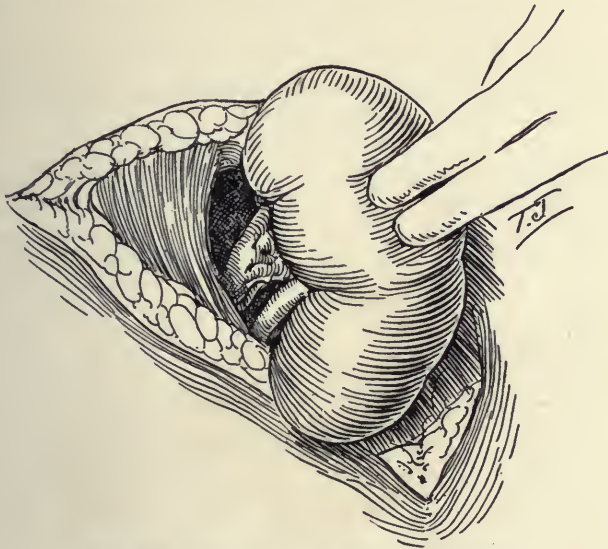


Fig. 284.—Exposure and delivery of kidney.

advantages: the hemorrhage is almost nil; there are no muscle stumps to be taken care of and, on account of the simplicity of the conditions of the wound, the healing process proceeds quickly and without any subsequent paresthesia in the renal region, because neither nerve nor muscle has been subjected to serious or important surgical trauma.

CLINIC OF DR. D. B. PHEMISTER

PRESBYTERIAN HOSPITAL

ANKYLOSIS OF THE JAW FOLLOWING RHEUMATISM: ARTHROPLASTY

Summary: Acute articular rheumatism in a boy of seven years producing complete ankylosis of the lower jaw. Diagnosis. Treatment—resection of articular condyle of mandible—closure without interposition of flap of fascia or other material—postoperative treatment; result four months after operation.

THIS boy, who is sixteen years old, came to the hospital four months ago because of ankylosis of the jaw of nine years' standing. Between the ages of four and seven years he was treated in this hospital for three severe protracted attacks of articular rheumatism, the last of which kept him here for thirteen months. The joints of the extremities only were affected until eight months before leaving the hospital, when limitation of motion was first noticed in the jaw and some stiffness of the neck developed. The condition in the jaw gradually increased as the extremities improved, and a few weeks after leaving the hospital his jaw became permanently ankylosed. Since then there has been no recurrence of the arthritis in the extremities, but the neck stiffness has slightly increased. He has fed himself by pushing macerated food through the space between the overriding upper and lower teeth. The unsightliness of this act has prevented his appearance at the table for meals.

Physical Examination.—The patient is an undersized boy for his age, whose head is fixed in a slightly flexed position. His chin is markedly receding, and the lower lip, which shows a greater degree of development, is markedly everted (Fig. 285). The mouth is closed and the lower jaw firmly fixed. The teeth are foul and many are decayed. The anterior ones slope forward

and the upper row overrides the lower by $\frac{1}{2}$ cm. The upper portion of the neck is quite rigid. Physical examination of the rest of the body is negative. On examination it is impossible to say about the relative degree of involvement of the sphenomandibular joints. The x-ray shows bony ankylosis on the left side and an absence of bone changes on the right. The lower jaw is undersized, but the angle and symphysis protrude slightly



Fig. 285.—Patient with ankylosis of the jaw. Photograph taken before operation.

beyond the line of the body. The lower second molar teeth are almost the width of a tooth back of those of the upper jaw (Fig. 286). The stiffness in the neck is seen to be due to ankylosis of the laminæ, the upper intervertebral spaces showing little change.

The left side was operated on through an incision which began about 1 cm. below the lower margin of the zygoma and 1 cm. in front of the tragus. This was extended upward above the

zygoma and slightly forward, being about $1\frac{1}{2}$ inches in length. It lay in front of the temporal artery and back of the temporo-facial branch of the seventh nerve. The zygoma and outer surface of the condyle and neck of the mandible were freed of soft parts. The joint was completely obliterated by firm bony ankylosis. With a curved periosteal elevator the anterior and posterior borders of the neck were exposed, after which the head and neck of the mandible were chiseled away, leaving a bony defect of about $1\frac{1}{2}$ cm. The mouth was then opened by means of a threaded top separator until the ordinary jaw separator



Fig. 286.—x-Ray taken before operation showing obliteration of left sphenomandibular joint. Note overriding of lower teeth by the upper.

could be introduced. By means of the latter it was slowly opened about $\frac{3}{4}$ inch. Care had to be used in this act to prevent injury of the badly decayed teeth. The wound in the soft parts was closed without the introduction of any substance to fill out the gap left by the resection of the head and neck of the mandible.

Postoperative management consisted in repeated daily separation of the teeth by means of the threaded top during the first two weeks, after which a spreader appliance was made by Dr.

Frederick B. Noyes. It consists of cast metal splints cemented on to the upper and lower teeth and connected by a bridge about 1 inch long which was hooked into the upper splint and connected to the lower by means of a rubber band passing from two hooks on the lower splint over the hook on the lower end of the bridge, thereby exerting continuous traction, which brought about separation of the jaws (Fig. 287). Spreading by this



Fig. 287.—Metal splints with rubber band for maintaining constant traction on mandible.

means was kept up all night and during most of the day for the first month. When it was not in action the patient was encouraged to use the jaw as much as possible, especially by chewing gum. Later on the splint was applied only at night.

As you see the patient today, four months after operation, the mouth can be opened only about $1\frac{1}{2}$ cm., but a very satisfactory functional result has been obtained and the patient can now feed himself and masticate food thoroughly (Fig. 288).

The etiology is perhaps the most unusual feature of the case. It is rare to see involvement of the sphenomandibular joint in recurrent rheumatism of childhood producing ankylosis in this region without involvement of the joints of the extremities where the disease had been more protracted and extensive. The other feature of the case was the use of the splint as devised by Dr. Noyes.



Fig. 288.—Photograph of patient five weeks after operation. Mouth can be opened $1\frac{1}{2}$ cm. Note metal splints in place.

The operation has created a pseudo-arthritis on the ankylosed side and re-established motion in the unaffected joint whose cavity had probably been obliterated during the long period of disuse. It shows that the interposition of soft parts is not essential to the re-establishment of motion in ankylosed joints.

The patient has been advised to undergo a second operation in about six months for correction of the deformity of the chin by bone implantation.

CONTRIBUTION BY DR. ROY L. MOODIE

DEPARTMENT OF ANATOMY, UNIVERSITY OF ILLINOIS,
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THE USE OF THE CAUTERY AMONG NEOLITHIC AND LATER PRIMITIVE PEOPLES

Summary: Cauterization of the scalp, with subsequent lesions on the skull, practised in Neolithic times in France, and was in use in later times in Central Asia, Canary Islands, in Europe during the Dark and Middle Ages, in Peru, and in Africa, where the practice was known to Celsus. The operation doubtless performed as a therapeutic measure for the relief of melancholia, epilepsy, and other nervous afflictions accompanied by convulsions. Knowledge of prehistoric practices confined to the evidences on the bones. Not usually associated with trephining, though the skull was often perforated in cauterization, and has certain points in common with trepaning. Its distribution is relatively the same. Procedure not known definitely, but the assumption is that the cruciate incisions were made with either a heated stone or metal knife or with an unheated implement and boiling oil poured into the wound. An interesting succession of surgical practice in widely remote areas and times is shown in the fact that the same type of incision was used from Neolithic times down to the time of the successors of Galen in the Dark Ages. Similar procedures in use as late as 1860, when counterirritants were applied to the scalps of demented patients.

THE study of prehistoric surgery is a phase of Paleopathology, and one which serves in interpreting various osseous lesions seen on the remains of prehistoric peoples. The present study of cauterization among primitive and ancient peoples enables us to interpret a remarkable lesion seen on the skull of an ancient Peruvian woman, which is exhibited in the large cross shown in Fig. 289, *E*, and in Fig. 291, *A*.

The anthropologic features of cauterizations were first investigated by Manouvrier, a French anthropologist, who studied the curious lesion, since known as the *sincipital T*, on skulls (Fig. 290) bearing marks of cauterization of the scalp from

dolmens belonging to the Neolithic period (3000–7000 B. C.). The crania in question were collected from the Dolmen de la Justice at Epône, near Mantes, on the Seine River, Seine-et-Oise,

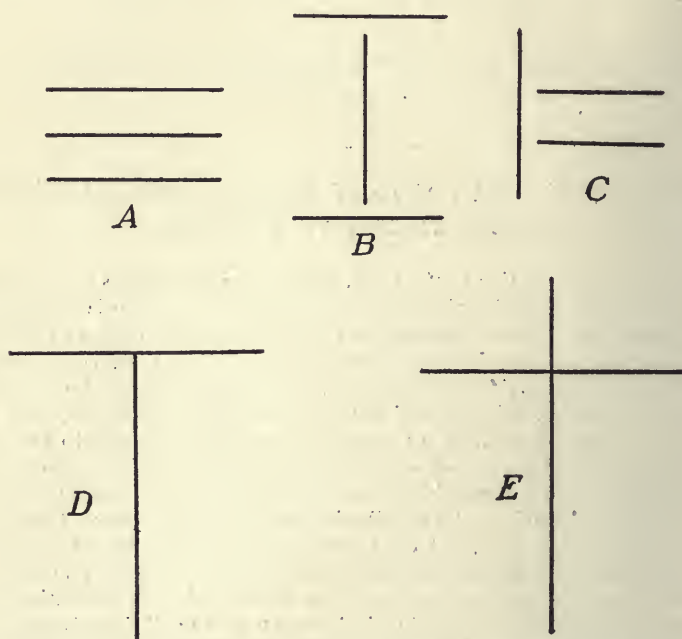


Fig. 289.—Schemata of scalp incisions made at various periods, from the Neolithic to the Middle Ages, to allow the application of heated objects, irritants, or other substances to the heads of demented individuals, usually women. *A*, *B*, and *C* show the type of incisions made in the Middle Ages for the relief of the “cold humours in the head.” (After Sudhoff.) *A* made on the forehead. *B* made on the temple. *C* made on the occiput. *D*, the type of incision used by the Neolithic surgeons of northern France, of which *A*, *D*, and *C* are doubtless descendants, though they vary from it. *D* is the type of incision called the “sincipital T.” *E*, the variant of the sincipital T as used in Peru, and seen on the female Peruvian skull shown in Fig. 291.

in France. This dolmen had been known since 1833, as MacCurdy tells us,¹ and it was commonly supposed from its delapidated appearance that it had long ago been explored and robbed of its contents. In 1881 M. Perrier de Carne, of Mantes,

¹ G. G. MacCurdy: 1905—Prehistoric Surgery—a Neolithic Survival, *Amer. Anthropol.*, vii, No. 1, pp. 17–23, 1 plate.

thought it worth while to obtain from the owner, Madame Piot, a permit to excavate, and was surprised to find the sepulture, which usually lies beneath these mounds, intact and containing

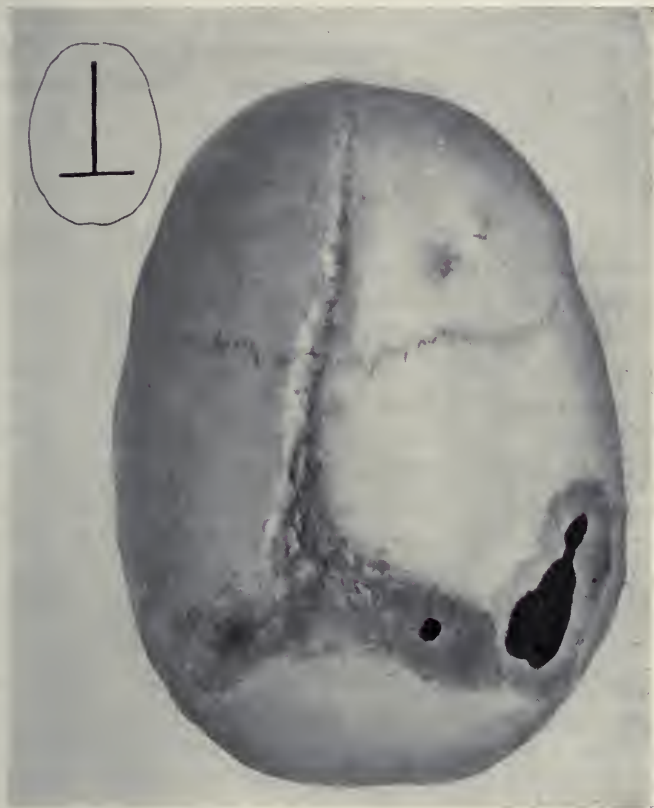


Fig. 290.—A female Neolithic skull (six thousand years old) from Seine-et-Oise, France, showing the effects of cauterization of the head, possibly for the relief of mental disturbances. The surgeon was so eager to effect a cure that he burned holes through the skull twice on the posterior portion of the right parietal. The sincipital T is shown in the upper left corner. The slight scar on the right frontal is an accidental burn. (After Manouvrier.)

pottery, stone implements, ornaments, and portions of 60 skeletons, with 12 crania. These dolmens are often extensive the largest known covering an area of five and a half acres, and

attaining a height of 130 feet. Under the earth mounds are usually found sepulchral chambers; often interesting examples of primitive architecture. The highest expansion of the dolmen is to be found in the pyramids of Egypt, which are elaborate examples of the same idea. The Indian mounds, so common in North America, are of the same type, and instances of similar methods of burial are found in South America in the chulpas of ancient Peru. There are many thousands of these dolmens in western Europe, about 8000 in England alone.

The skeletal material, obtained from the Dolmen de la Justice, at Epône, was referred to Professor Manouvrier for study and description. Among other interesting observations he noted that 3 of the female crania were marked by curious lesions on the vertex, and similar on all the skulls. The mutilations were in the form of a T-shaped cicatrice, for which Manouvrier could offer no explanation. The lesion takes the form of a long anteroposterior groove or ridge, extending from the anterior curve of the frontal, along the sagittal suture, terminating usually near the obelion, where the transverse branch is encountered, but at times extending on down over the occiput to near the foramen magnum (Fig. 290). In the Peruvian skull, previously mentioned, the sagittal lesion has a length of 210 mm. fading out into indefinite lesions anteriorly and posteriorly. (Fig. 291). The transverse lesion is not long, having in the Peruvian skull a length of 150 mm., though in the Neolithic skulls it was shorter. The transverse lesion is in all cases curved anteriorly. The scars in the Neolithic skulls are evidently the result of lesions of the scalp made during life, and are often deep enough to affect either directly through contact or indirectly through suppuration the periosteum and adjacent bone.

Manouvrier found in the Broca collection 3 other female skulls showing similar cicatrices. These skulls came from dolmens in the neighborhood of the Dolmen de la Justice, and were found in the dolmens at Vaureal, Conflans-Sainte-Honorine, and Feigneux, all in the Department of Seine-et-Oise. The lesion in one of these 3 skulls was very slight, in the other either

the wound or the subsequent suppuration had uncovered the diploë.

No other pathologic features were present on the skulls. The lesions were often interrupted, as if the knife making the incision did not always come in contact with the periosteum. Various explanations were offered for these lesions, and Manouvrier suggested that an explanation might be found in practices connected with religion, war, penal justice, mourning, therapeutics, and coiffure. The lines of incision usually follow the line of parting of the hair, and it is possible that the incisions were made here because of the ease of access.

Interest in the subject was thus aroused, and other dolmens north of Paris were searched for further examples of skulls bearing the sincipital T. Among 40 skeletons found by M. Fouju in a dolmen of Menouville, near l'Isle d'Adam, north of Paris, 5 skulls showed evidences of surgical interference; 3 undoubted cases of trepanation; the other 2 showing portions of the sincipital T. After studying other specimens, especially those described by Verneau from the Dolmen des Mureaux, Manouvrier reached the conclusion that cauterization by burning or other treatment appeared the most probable, and doubtless corroborated the idea that there were surgeons among many of the Neolithic peoples who lived near the Seine and the Oise rivers who had recourse to the process as a therapeutic measure not less terrible than their practice of trepanation.

The next step in the proper interpretation of these ancient lesions was a comparison between the prehistoric evidences and more recent ones, especially the ancient Guanche skulls described by von Luschan from the Canary Islands, where 25 skulls showed scarification similar to the Neolithic ones studied by Manouvrier. Von Luschan regarded the operation as related to trepaning and distinctly of a surgical nature.

An intimate insight into the possible method of procedure among the Neolithic surgeons in cauterization may be gathered from the quotation, given by MacCurdy, from the work of Lehmann-Nitsche, who says that the ancient chroniclers of the Canary Islands, as cited by Chilly Naranjo, say that:

"They made large scarifications with their stone knives on the skin of the part affected, and then cauterized the wound with roots of Malacca cane dipped in boiling grease; preference being given to the use of goat's grease."

This suggestion of Lehmann-Nitsche's, combined with a new observation by Manouvrier on ancient surgical practices as outlined by Brachet,¹ prove beyond question that the sincipital T marks on ancient crania and those of later times may be explained on the same basis—that of cauterization. Brachet quotes Avicenna and Albucasis, as set forth in the works of Daremberg and Leclerc, to the effect that in cases of melancholia cauterization was resorted to in order to reduce the amount of cold humors in the head. Sudhoff has shown the various types of incisions made for cauterization of the forehead, temple, and sinciput. These are shown in Fig. 289, A, B, C. That this surgical lore was handed down from Neolithic times to the surgeons of the Dark Ages there can be little question. Some of the links in the chain of evidence are lost owing to the practice of incineration in some periods, but enough is known to establish the practice beyond question. The final link was supplied by Manouvrier, who described a skull (Fig. 290) which showed in numerous ways the results of the cauterization in a female skull from the dolmen of Champignolles, between the Seine and the Oise. As may be seen from the figure, the skull is perforated in two places. These openings are, without doubt, the result of cauterization and may have been intentionally burned there by the surgeon in his zealous desire to drive out the demon of melancholia.

It is a long way from the Seine-et-Oise country to Peru, but in this latter place evidently the same practice came into existence some five thousand or six thousand years later. It is not surprising to find this same practice in these widely separated areas, since it has been previously shown that trephining was practised in northern France and in Peru, and very little elsewhere in ancient times. These two regions seem to have been

¹ *Pathologie mentale des rois de France, Louis XI et ses ascendants*, Paris, Hachette, 1903.

the foci for the development of primitive surgical practices, though there was no means of intercommunication possible.



Fig. 291.—The pre-Columbian (possibly five hundred years old) female skull from Amazonas, Peru, showing a variant of the sincipital T (shown in *A*). The cauterization must have been very intense, since great osseous ridges have developed along the lines of the incisions (shown in detail cross-section in *B*). The skull is the property of the American Museum of Natural History.

It is extremely odd that nearly all the injured skulls, with possibly two exceptions, were female. The Peruvian skull is



Fig. 292.

that of a female (Fig. 291). The lesions on the pre-Columbian female skull from Peru may be regarded as a variant of the Neolithic T. The surgeon seems to have been eager to make a good incision, since he penetrated not only the scalp and the *gala aponeurotica*, but also the periosteum and left a widely gaping wound, which after contact with the cauterizing substance, boiling oil or heated object, became violently infected, and produced during the course of a few weeks an enormous hypertrophy of bone, especially in the outer skull table. The incisions instead of making a sincipital T, are in the form of a latin cross with the longer portion of the upright anterior to the obelion.

One can picture (Fig. 292) the primitive blanket or skin-clad Indian shaman holding the head of the demented patient on his knee while he very roughly cuts the scalp with a sharp-edged flint knife. Close at hand on a slow wood fire is an earthen pot containing animal fat, possibly the fat of the llama, which was the commonest domestic animal of the ancient Peruvians. Nearby on the ground lies a twisted wisp of vegetable fiber which the surgeon takes after making the scalp incisions and dipping it into the boiling animal fat applies to the wound. Can anyone imagine a fit of melancholia so stubborn as not to

Fig. 292.—The scene depicted here is a reconstruction showing a surgical operation being performed by a pre-Columbian Indian shaman, in the highlands of Peru during the time of the Incas, five hundred years ago. The operation is typical of the ancient Peruvians, as well as of the more ancient Neolithic medicine-men of northern France, who seemingly practised it for the relief of melancholia. The technic consisted in incising the scalp in the form of a cross or a large T with a sharp-edged flint or bronze knife. The shaman is here shown using a large flint, and is tensing the scalp preparatory to making the transverse incision. Boiling oil is then applied to the wound with a wisp of vegetable fiber, seen in the foreground. The only antiseptic is a quid of *caco* which the operator holds in his cheek. Whether any form of dressing or bandages were applied after the operation is problematic, though the wound may have been dressed with cooling leaves, held in place by a strip of cloth. If so, the Peruvian woman whose skull is shown in Fig. 291 did not properly care for the bandages, since there was a wide-spread infection. The jar of bubbling oil on the slow fire to the right of the operator is typical of those used by medicine men of the Inca period in Peru. Though usually containing bits of magical objects, bones, seeds, moss, etc., they were probably used for the purpose shown. The rock shelter is in the midst of the Andes where these ancient Indians lived amid the highest and most inaccessible cliffs.

yield instantly to such treatment? Would not the patient have an instant and hearty interest in mundane affairs? The painfulness of the operation would doubtless increase the operator's delight in the suffering of the patient, since we are assured from enormous lesions made in trephining that the prehistoric surgeon was not very attentive to the physical comfort of the sufferer.

Lest my readers think my Neolithic surgeon too heartlessly cruel, bear with me while I quote from "Treatise of Surgery" translated by a Belgian, one Abraham Lenertzon Fox, from the German of the Swiss Surgeon (Citie Surgeon of Basell), Felix Würtz, in October, 1632, and later rendered into English by William Johnson. The vogue of this little surgery may be judged from the fact that the Belgian translation was made "out of the last copy, which by reason of its special utilitie, was reprinted then *the 28th time* in the German Tongue."

Under the heading "Abuse of hot irons in blood-stenching, which cause great hurt. A horrible skill," he says:

"These abuses hitherto shewed, about blood stenching, are great and grosse ones, whereby incurable hurts are caused; and yet they are not comparable unto those which are committed with hot irons, whereby the patients' wounded veins, sinews, and other parts are drawn and shrunk together and haled, as if pulled by a horse. And this is held a great Skill amongst many; but it is, in my opinion, such a terrible Skill, which merely belongeth to murders, and I am easily persuaded, that Hangmen have taught this way at first: Others, that will outstrip their fellows in their Skill, take cotton wool, thrust it lighted into the Wound, whereby they suppose to have done well for the good of the Patient.

"But as I have said in general, that I reject nor condemn blood stenching, but rather hold it necessary and allowable, as occasion serveth: neither do I wholly condemn hot Irons to stench blood withal, and hold it to be of very good use in Surgery, as at the off-cutting of a member, at the thickest part of the thigh, and in two or three places more; as when an excresence is to be cut off; or other things, well known to judicious Surgeons. But that it should be of any use in wounds, there I deny it absolutely, and am fully persuaded, that nothing but misery thereby is caused. For as soon as the little white veins feel the heat of the fire, they shrink presently, grow shorter, and may never be brought to their former length; all judicious Surgeons must confess so much. Unto which misery this is incident

also, or rather will ensue thereupon, that a Wound thus burnt will never heal so soon and so well as those will, which never had such things supplied, the reason of it is known to many. And ah! how many Wounds are thereby inflamed, and the parties lame, when doubtless they might have done better.

"In my youthful dayes I have been an eye witness, how one received a Wound about his temple of four fingers breadth; oh! how was this poor man tortured with Corrosives, with lighted cotten Wooll, with nealed Iron, and the like, being thrust into his Wound, and all to no purpose; for the bleeding of it could not be quenched. All these Surgeons being in despair about their Patient, whom they thus unmercifully tormented, not knowing what to do any further in this case, they wish'd the Patient to commit himself to God Almighty, which however ought to be done without their grave advise: when all their applied means would neither take nor work, there came forth an old Woman, laid some kind of haire on a leather, and laid into Wound a piece of lint or quilt, and then she applied her plaister: it stetched the blood and the party was healed: was not this old Woman more skilful, and surer in her Art, than all these Surgeons, Barbers, Doctors, that were then present? My self at that time being very young, and unexperienced, was ashamed for their sake, though I had very little judgement, and they professing that Art had so little judgement in it."

While we may be amused at the quaint sayings of the ancient surgeon, yet his remarks recall forcibly to us how little progress had been made in a real understanding of surgical procedures from our Neolithic surgeon, who was probably not so ignorant as we may think, to the surgeons of the Middle Ages. Not only was the same type of incision used over a period of several thousand years, but the same ideas prevailed regarding the efficacy of heat until a relatively recent period. We may be assured that the Neolithic surgeon practised on dead material from the number of postmortem trephinations which have been discovered, and in this way acquired some skill in his profession. His understanding of the necessity and success of the operation was fully as good as that of the associates of Felix Würtz in the seventeenth century.

Further evidence of the use of the cautery in past times is given by Charles and Dorothea Singer¹ in discussing a figure of

¹ On a Miniature ascribed to Mantegna, of an operation by Cosmas and Damian. Contribution to Med. and Biol. Research, Dedicated to Sir Wm. Osler, vol. 1, p. 172.

a medieval surgical operation. They say regarding one of the persons shown:

“He stands in his green coat with clasp hands and eyes fixed with wonder on the transplanted limb. On the sides of his scalp above the right ear are to be seen two white hairless linear areas. The position and form of these marks suggests that they are not the effects of some disease, such as *Alopecia areata*, but are the result of the use of the cautery in the temporal and parietal region. This is a remedy against headache often resorted to in the Middle Ages.”

CLINIC OF DR. ROBERT H. HERBST

PRESBYTERIAN HOSPITAL

AN UNUSUALLY LARGE PROSTATE GLAND

Summary: Value of long interval in two-stage prostatectomy in certain class of cases—beneficial effect of bladder drainage. Second stage of operation in present case—removal of prostate gland weighing $\frac{1}{2}$ pound (250 grams).

THE first patient, Mr. B., has had urinary trouble since 1893, in which year he had an attack of acute retention of urine following a cold bath taken while perspiring freely. Since that time he has had a half-dozen attacks of acute retention. There is no history of any venereal infection. For the last twenty years he has had a slowly progressing urinary disturbance, consisting of frequency, dribbling, and painful urination, accompanied by a great deal of straining. After urinating he had the sensation of not having completely emptied his bladder.

About a year and a half ago he had an acute swelling in the scrotum accompanied by redness and pain. This subsided rather readily and has not recurred.

Five months ago he consulted us because of the increasing difficulty in urinating. Upon examination, a diagnosis of prostatic hypertrophy was made. At that time he would not consent to a prostatectomy and a suprapubic cystotomy was performed for drainage of the bladder. From that time until the present bladder drainage has been accomplished by means of an in-dwelling Pezzer catheter through the cystotomy wound. This catheter was removed for cleansing every two or three days. A few days ago on removing the catheter for cleansing it broke off, leaving the expanded portion within the bladder. This accident greatly alarmed the patient, and he again consulted us.

We notice that in these five months during which there has been good bladder drainage his general physical condition has been much improved.

A general physical examination shows the patient to be in rather good physical condition for a man seventy years of age. Examination of the prostate per rectum reveals a prostate which is very large, hard, and irregular in outline. Laboratory findings show:

Urine negative to chemical tests. There are no casts, but a moderate number of leukocytes are present.

The blood count is normal, but with a hemoglobin estimation of 80 per cent. His blood-pressure is 140 systolic and 85 diastolic, a reduction of 40 systolic since his first examination, made before the cystotomy of five months ago. The blood chemistry is approximately normal.

This improvement of the patient's general condition after bladder drainage is one of the striking things noted in most cases where a two-stage prostatectomy is done, even though the interval between the stages is usually much shorter than in this case. The shock of the first stage, the cystotomy, is not usually very great, and after a period of drainage the patient is not only in good condition for the second stage, the prostate enucleation, but also the tissues have shrunk and the congestion has lessened, so that there is not so great a likelihood of hemorrhage at the time of or following the enucleation.

Our operation today shall consist of the enucleation of his prostate. We enlarge the drainage opening, and upon exploring the bladder we find and remove the detached expanded portion of the catheter, which is covered with a crust of salt deposit. The prostate gland projects far into the bladder, is large in all its dimensions, and fills a large part of the bladder cavity. With my finger I have now freed the prostate from its bed, and find, on account of its enormous size, that I am unable to deliver it from the bladder *in toto* without enlarging my incision. By dividing the prostate into four portions I am able to remove it. There is comparatively little bleeding and no special measures will be taken to control hemorrhage. We now introduce a large Freyer drainage-tube into the bladder and suture the wound closely about it.

Postoperative Course.—Two days after the operation the

drainage-tube was removed, and from that time the opening gradually closed and the patient made a good recovery.

Sections made from the removed gland showed no evidence of malignancy. The entire specimen removed weighed 250 grams

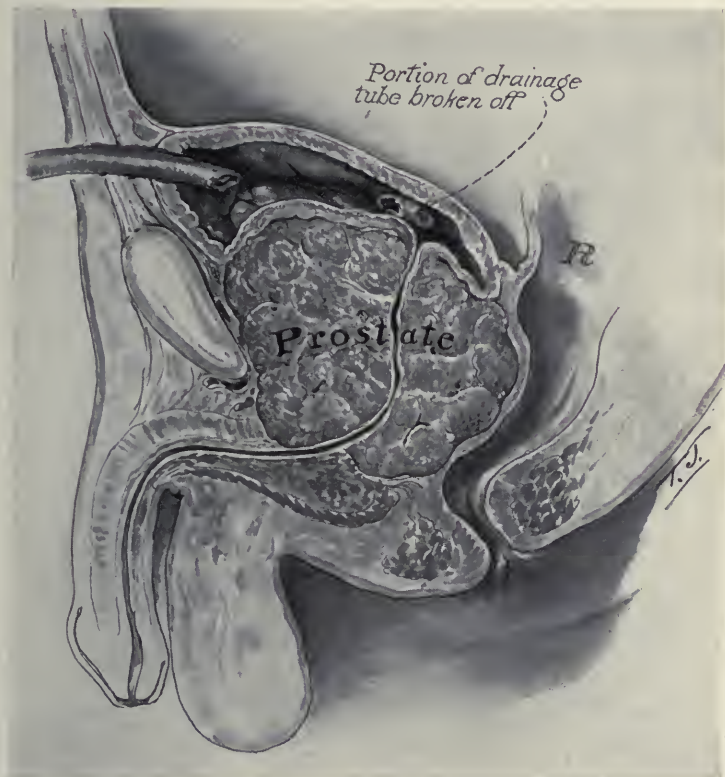


Fig. 293.—Diagrammatic representation of bladder conditions just prior to second stage of operation. Note enormous size of prostate and tip of drainage-tube free in bladder.

($\frac{1}{2}$ pound). This prostate is unusually large, and while not so large as some prostates previously reported, it is sufficiently interesting to report on account of its large size, long course, and continued benignancy.

ULCER OF THE BLADDER

Summary: Simple ulcer of bladder. Method of diagnosis by elimination. Inadequacy of ordinary forms of treatment. Operation by excision of ulcer and part of bladder wall.

THE second case which we present today is an unmarried woman, twenty-three years of age. Six years ago she began to have a slight urinary frequency which she noticed chiefly on account of the nocturnal frequency. This condition has progressed gradually until at the present time she is obliged to void from ten to twenty times during the night and a proportionate number of times during the day. The urinary frequency is associated with pain and extreme urgency. There is also pain and tenderness in the bladder region. The amount of urine voided each time is about 1 ounce, and the bladder will hold only about $1\frac{1}{2}$ ounces when filled to its capacity. No treatment was sought during the first year of her illness, but since that time she has been almost constantly under treatment.

About three years ago we saw her for the first time. On cystoscopic examination we found a small linear ulcer in the vertex of the bladder posteriorly about 2 cm. above the left ureteral orifice.

She has had almost every known form of bladder treatment, including irrigations, injections, and instillations, all without marked benefit. The ulcer was fulgurated with the high-frequency current, but healing was not effected. Later, about two and a half years ago, I performed a suprapubic cystotomy, curetted the ulcer and cauterized its base, and this also failed to effect a cure. In the meantime the patient returned home and has continued various forms of local treatment until two months ago, when she came under our care again.

We have made a diagnosis of simple ulcer of the bladder after excluding all other ulcers of known etiology. The Wassermann test is negative. We failed to find tubercle bacilli on

repeated, careful urine examinations, including cultures and smears of the urinary sediment. Three sets of guinea-pig inoculations, including each time inoculations from the bladder and from each kidney, have failed to give any evidence of tuberculosis.

Physical examination shows the patient to be well nourished and in a general way appearing to be quite normal. The teeth



Fig. 294.—Sketch showing location and relative size of ulcer; dotted lines indicate direction of incisions for its removal.

are sound and the tonsils are enlarged. There is no tenderness over the bladder.

The blood-pressure is 120 systolic and 75 diastolic. The blood count is normal. The urine gives a slight reaction for albumin and the sediment contains many pus-cells, but no red blood-cells or casts.

Cystoscopic Examination.—The bladder holds about $1\frac{1}{2}$ ounces. A linear ulcer about $2\frac{1}{2}$ cm. long is seen on the posterior wall of the vertex of the bladder, extending in a transverse direction and spreading out slightly at its right extremity (Fig. 294). It is about 2 cm. above the left ureteral orifice. The entire bladder wall is moderately injected, this being more marked in the immediate vicinity of the ulcer. The ureteral orifices appear normal.

The etiology of the so-called simple ulcer of the bladder is unknown. They are by some observers thought to be secondary to focal infections, especially tonsillitis. Hunner reports 18 cases of simple ulcer in which many forms of treatment had been tried, all of them without satisfactory results except the resection of the ulcer, including that portion of the bladder wall involved by the ulcer. In the cases in which resection was practised the results were fairly good.

In this case I shall resect a portion of the bladder wall including the ulcer. After making a suprapubic incision and exposing the bladder I carefully separate the peritoneum from that part of the bladder wall to be resected. The site of the ulcer has been quite accurately located previously by cystoscopic examination. Now, with the bladder exposed, the ulcer site can be felt as a thickened, indurated area. The bladder is incised anteriorly in the midline. With the aid of our retractors the inner surface is inspected and the ulcer is plainly seen. I shall resect a triangular portion of the bladder wall including the ulcer and well-beyond it in all directions. This brings the lower angle of our incision very close to the left ureteral orifice, but leaves enough tissue for suturing the bladder wall. We next suture the bladder wall, leaving a small opening in the lower anterior angle into which we introduce a Pezzer catheter for drainage. A small gauze drain is placed in the prevesical space. To insure perfect drainage of the bladder I shall also insert a Pezzer catheter in the bladder through the urethra.

Postoperative Course.—The patient has been comfortable following the operation. The gauze drain was removed after twenty-four hours. The suprapubic tube was removed after

forty-eight hours. The urethral catheter was removed on the fifth day.

Histologic examination of the tissue removed showed there was no evidence of tuberculosis in the sections. The tissues about the ulcer showed evidence of chronic inflammation.

Subsequent History.—Examination ten weeks after operation showed the bladder capacity increased to 3 ounces. Cystoscopic examination revealed the site of excision healed. The scar appeared smooth and healthy.

CLINIC OF DR. ALBERT H. MONTGOMERY

PRESBYTERIAN HOSPITAL

TWO CASES OF MUSCLE INJURY

Summary: Two cases of muscle injury, one a rupture of the biceps and the other a rupture of the triceps. Immediate suture proper treatment—technic. Early active motion essential to a good functional result.

OUR service offers two somewhat unusual cases of muscle injury.

This first patient is a shipping clerk thirty-six years of age. He came to the hospital yesterday complaining of weakness and discomfort in the left arm. Ten days ago, while lifting a heavy desk top, he jammed his hand between the top and the body of the desk. The sharp pain caused him to make a sudden, involuntary twist of the arm, without relaxing his hold on the object. Immediately something in his arm gave way with a sudden snap that was heard several feet away. He felt no pain, but the arm at once became weak. He noticed a change in the contour of the arm and marked lameness when he tried to bend it. There has been no swelling or discoloration. Hot fomentations and rest were employed, but the arm has not regained its power.

Physical examination of this man is negative except for the left arm. Here you can readily see a deformity in the shape of the biceps muscle. It appears to be elevated more than normal and ends abruptly about 3 inches above the elbow-joint. As I palpate the biceps from above downward the fleshy mass of the muscle feels soft and doughy, and here at the lower end it is slightly movable along the arm. I can feel no evidence of the tendinous portion of the muscle below this point. Now as the patient bends the arm you can see this mass draw up and change

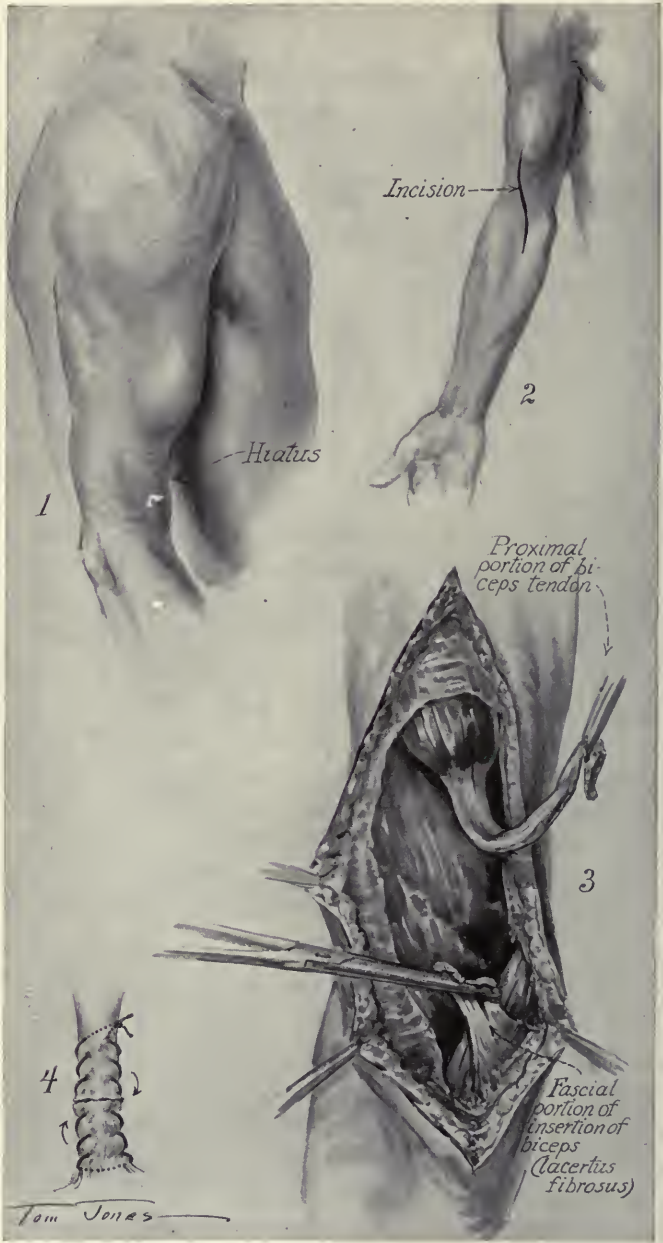


Fig. 295.

in form so that it is markedly elevated and shortened. It feels harder than it did with the arm in extension. Again palpating about the elbow for the biceps tendon, I can feel no evidence of it, although in this flexed position of the arm it should stand out prominently. If I now resist him while he bends both arms, the weakness in the flexing power of this left arm is distinctly noticeable.

The diagnosis of a rupture of the biceps muscle is, of course, evident.

Obviously the treatment of this condition is an immediate operation to restore the continuity of the torn muscle. We will do this operation under ether anesthesia, with the arm extended on a board. Our incision starts on the outer side of the arm just below the muscle mass and is carried downward almost to the elbow, where we curve across to the inner side of the forearm. This slightly wavy incision will allow for any possible scar contraction that might otherwise interfere with full extension. It also keeps our skin wound away from the underlying operative field. It is well to remember this last point in tendon suture operations. As we retract the edges of the wound the fascia appears, and we incise it. This exposes the biceps muscle, and here is the tendinous portion lying free in the wound with a few small blood-clots attached to the torn surface. It has evidently ruptured close to its attachment. Following our wound downward over the elbow-joint, we come upon the lower portion of the tendon. This torn edge is evidently the point where the biceps runs over to the tubercle of the radius and shades off into the fascia of the forearm. Now if we grasp the upper portion on each side with artery forceps and make traction downward and slightly flex the elbow at the same time, the ends of the tendon can be brought together very readily. With a strong piece of chromic catgut on a curved needle we are ready to begin our suture. Several varieties of tendon suture have been described,

Fig. 295.—1, Shows appearance of arm after fracture of biceps muscle which has retracted upward, producing a marked hiatus. 2, Arm in front view, showing curved incision. 3, Wound opened and tendon ready for suture. 4, Type of suture used to unite tendon.

but we have found the Frisch stitch the most reliable. Beginning about $\frac{1}{2}$ inch above the upper end of this portion, we grasp a small bundle of fibers along the outer side of the tendon in the bite of the needle. A second and a third bite are taken around the same fibers a little nearer to the end. In this way the bundle of tendon fibers is caught in a spiral of catgut that wraps firmly around them and does not tend to pull out. This same suture is now carried across to the distal portion of the tendon and two or three bites are taken in the outer edge in the same manner to get a good grasp on a bundle of fibers. Next the needle is carried through this distal portion to the mesial side where a small bundle of fibers is encircled in the needle bites and the suture carried across to the mesial edge of the upper portion. Three bites are taken in this edge and the catgut is now on a level with the starting-point on the outer edge. The needle is carried through the tendon to this point and the ends of the suture tied. This you can readily see makes a firm grip on the tendon ends and secures strong approximation. Now, if you wish, we can place a few small apposition sutures across the torn ends, but it is hardly necessary in this case. To test the strength of our suture we now extend the forearm completely, and you will notice the stitch holds securely and pulls the biceps down to its proper place. The fascia is closed with catgut and the skin wound with interrupted beeswax silk sutures. The arm extended will be put up in plaster for ten days and then the man will be urged to use it at once.

Note.—This wound healed by primary union. The tendon suture held firmly and the strength of the arm returned rapidly. Two months after operation he had full power of flexion and was able to resume his work.

Our second patient was treated by Dr. Dean Lewis, who has kindly permitted me to present him to you. This man is twenty years old. When he came to the hospital he stated that four weeks previous a heavy truck had backed into him and jammed him against the wall. He attempted to fend off the truck, but the heavy tail-board caught his left arm and squeezed it quite badly and cut his right hand. He immediately felt severe pain

in the left arm and was unable to use it. He was taken to the hospital, where the hand was dressed, but no treatment was given to the arm. Subsequently the arm became black and blue and much swollen, but gradually these changes subsided. The weakness in the arm, however, continued up to the time he came to us.

Physical examination at the time of entrance into the hospital was negative except for the condition of the left arm. On the posterior surface about the middle of the arm a rounded mass could be plainly seen. This was somewhat soft and doughy, but became harder and drew up when the patient extended his forearm. This mass was only slightly tender and the arm showed no swelling or discoloration. Distal to the mass there seemed to be a lack of fulness in the arm. The patient could execute all movements of the arm and forearm, but extension at the elbow was very weak.

Obviously the diagnosis was a rupture of the triceps muscle. Operative treatment was advised.

Under ether anesthesia an incision was made in the course of the triceps muscle over the tumor mass. This exposed a definite rupture of the triceps muscle through the fleshy portion. There was some bloody fluid in the cavity made by the separation of the muscle, and some small blood-clots were adherent to the torn ends. With deep mattress sutures of heavy catgut the muscle ends were brought snugly together. A few interrupted catgut sutures were placed between the torn edges. The wound was then closed with subcutaneous catgut and waxed silk skin sutures. No fixation dressing was used and the patient was permitted to use the arm at once.

The wound healed without infection. Active movement of the triceps was encouraged and the muscle gradually regained its strength.

Today we present this patient two months after operation. As he moves the left forearm you will notice the free action of the triceps muscle. Palpation of the muscle shows the evident continuity. If I resist the patient when he attempts to extend the forearms, I can feel that the power in the injured arm is

about equal to that of the other arm. Apparently the ruptured triceps has regained its tone and strength.

Discussion.—Rupture of muscle usually occurs when the muscle is in strong contraction. Our first patient was lifting a heavy object when the pain produced by injuring his hand caused him to move his forearm involuntarily. This brought into play a group of muscles antagonistic to the biceps, either the extensors or pronators. Their sudden action undoubtedly ruptured the tense biceps.

The second patient at the time of injury was strongly extending his forearm in the attempt to fend off a truck that was backing him up against a wall. At that moment the contracted triceps was struck by a heavy object. The muscle broke immediately at the place it was struck.

This snapping of a contracted muscle is well illustrated in 2 cases described by Davison. The patients were cavalrymen. During riding exercises the adductor muscles of the thigh are held in firm contraction. While in this condition, an unexpected movement of his mount partially unseated the rider in both instances and threw his leg forcibly against the side of the saddle. In both cases the strongly contracted adductor snapped like a taut bowstring.

The muscles most often injured are the biceps, triceps, quadriceps femoris, the tendo achillis and supraspinatus, and the adductors of the thigh.

Davis has recently reported a case in which the deltoid ruptured at its insertion. Coues describes a rupture of the pectoralis minor which the patient sustained when he jerked suddenly on a tackle rope with the arm extended above his head. These cases of ruptured muscles are easily diagnosed if the condition is only kept in mind. Many, however, are overlooked and neglected, such as the case of the triceps injury you have just seen. A patient with a rupture of the quadriceps of three months' standing was seen recently at the reconstruction hospital at Fort Sheridan.

The treatment in all cases is immediate suture. Firm approximation should be secured by strong catgut sutures properly

placed so that they will not pull out. It is equally important to insist on early active motion if a good functional result is to be obtained. Fixation dressings, if used at all, should only be employed for a few days.

In one of Davison's cases the torn adductor muscle was not sutured and a good functional result followed. Evidently there was sufficient strength in the remaining adductors of the thigh. This treatment of reliance on supplementary muscles should not be considered in injuries of such important muscles as the biceps and triceps.

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SURGICAL CLINICS OF CHICAGO

Volume 4

Number 5

CLINIC OF DRS. E. WYLLYS AND EDMUND ANDREWS
AND DR. CHARLES LOUIS MIX

ST. LUKE'S HOSPITAL

"DUMPING STOMACH" AND OTHER RESULTS OF GASTROJEJUNOSTOMY: OPERATIVE CURE BY DISCONNECTING OLD STOMA

Summary: DR. MIX: History of case. Physical, x-ray, and laboratory findings prove that previous gastrojejunostomy was not justified.

DR. ANDREWS: Ill-results which frequently follow indiscriminate gastric surgery. Technic employed in undoing gastrojejunostomy in present case. Indications for closing gastro-enterostomy stomas. Types of operation employed for this purpose.

DR. CHARLES LOUIS MIX: The patient, J. C. B., presented himself at Mercy Hospital January 5, 1920 with the following history:

When he was eighteen years of age he had a severe attack of measles from which he did not recover until two months had elapsed. Following this attack he began having seizures of pain in the left iliac region, coming on every year at about the same time. At first the attack lasted for only a week or two, and was relieved by such medicine as the doctor would give him. During the seizure the pain was constant, burning in character, and was relieved by eating. Associated with the pain was the belching of a tasteless, non-acrid gas. Though the belching relieved the sensation of distention it did not relieve the pain. Nausea was not present and the patient never vomited.

As the years went on the attacks became worse and of longer duration, until three years ago, when an attack came on which did not pass away at all. The pain was of the same character, but more severe and was not relieved by eating. It was relieved by pressure, this fact indicating that the pain was largely

due to spastic contraction of the circular muscle-fibers of the bowel. The medicines which had been previously used now had no effect. The pain continued daily until November, 1917, when the patient visited a surgeon, who, without giving an x-ray examination and without making a gastric analysis, said that he had "ulcers and a fallen stomach" and that he must be operated upon. He accordingly submitted to operation on November 17, 1917. At that time a gastrojejunostomy was made and he was told that the stomach was raised.

Following the operation the patient has never had a well day. He began almost at once to have pain in the hypogastrium and epigastrium. This pain has gradually become less severe as time has gone on, and at the present time is more annoying than painful. Another fact which the patient has noted is that he has what he calls explosive bowel movements of mucus. Previous to his operation his bowel movements had always been regular and normal, but following the operation he became constipated, and it was impossible to empty his bowels except by enemata. After enduring the discomfort from November, 1917 to December, 1918, he consulted a physician, who began treating him for mucous colitis. By dieting, treatment, and discontinuance of the enemata his colitis became gradually better.

His health continued more or less bearable until June or July of 1919, when further treatment seemed to be of no use. At that time he says his bowels became cramped and that the soreness in his abdomen increased. On drinking liquids he declared he could hear them rush down through his bowels. About four or five weeks ago he began to develop pain in the left epigastrium, burning in character and at times rhythmic, again indicating that it was due to spasm of striped muscle-fibers. The pain had no relation to the taking of food, was constant and sharply localized, not radiating into the thorax. The pain grew gradually worse, and of late there has developed a soreness in the lower abdomen. His appetite is good, but he is afraid to eat, and he has lost more than 20 pounds in weight. There has never been cough or expectoration or pain in the thorax. He has no shortness of breath, no precordial pain, no

palpitation, no swelling of the feet or ankles, no increased frequency of micturition, no nocturia, and no night-sweats. There have been no lightning pains or girdle sensations, no diplopia, no headaches, or cerebral symptoms. He does not sleep well on account of his abdominal pain.

There is no history of either gonorrhea or syphilis. Neither has he in his past history any signs pointing to the existence of either of these venereal infections. Aside from the measles which has been reported, he has had no other previous illnesses except chicken-pox and mumps during childhood. His habits have always been good. He drinks three cups of tea, no coffee, wine, or alcoholics. He does not use tobacco. Most of his life he has worked out of doors.

The family history is marred by the fact that his mother died of pulmonary tuberculosis. His father is living and well, now sixty-four years of age. He has three half-sisters and three half-brothers, none of whom are ill. He is married, but has no children. Cross-examined as to the health of his mother's family, he said that he understood that several of them died of consumption.

Such a history necessitates a careful exploration of the abdomen. Two facts stand out prominently: the first is that he suffered from some defect in the left iliac region which led to the erroneous diagnosis of ulcer and to the operation of gastrojejunostomy. The second fact is that the gastrojejunostomy which was done was not successful, because dating from it his health has been extremely bad. Though he does not vomit and is not nauseated, his story is suggestive of the possible establishment of a vicious circle. He was accordingly given a Rehfuß test-meal. The specimens were taken at half-hour intervals, with the following results (Fig. 296):

Blood examination showed 5000 white cells per cubic millimeter, 5,080,000 red cells, and 80 per cent. hemoglobin. Two analyses of feces showed blood to be present in both specimens with the benzidin test. On the other hand, the Weber test on the same specimens was negative. Urinalyses, of which two were made during his brief stay, were both negative. He was

next taken to the x-ray laboratory, where a fluoroscopic examination was made. The striking thing was the abrupt disappearance of the barium into the bowel. It apparently did

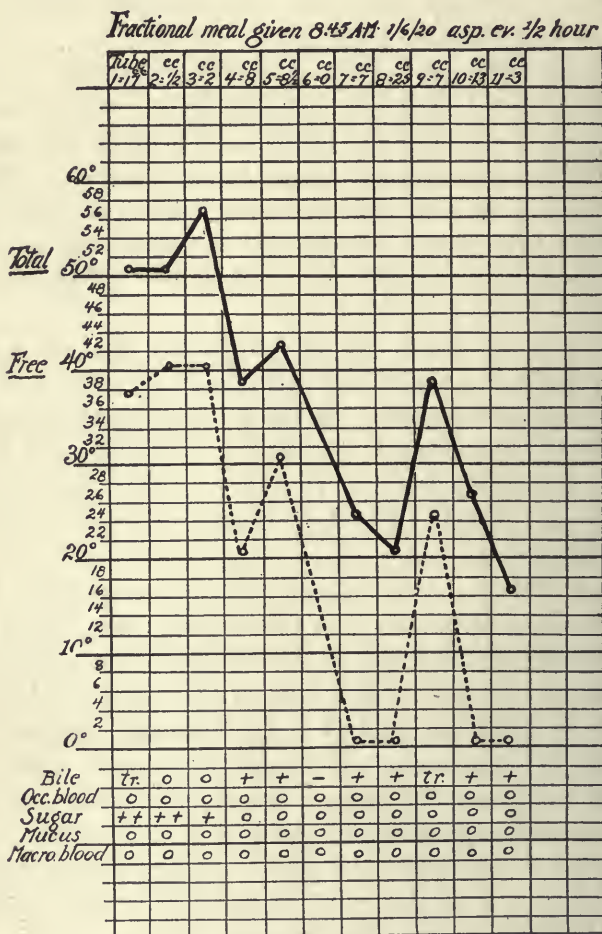


Fig. 296.—Chart showing results of Rehfuess test-meal at half-hour intervals.

not lodge in the stomach at all, but passed instantly from the stomach into the intestines. A picture was attempted, but before it could be made the barium was out of the stomach. It was necessary to repeat the test on the following day, and a

skiagraph was made while the patient was actually drinking the barium mixture. In this way we succeeded in getting a skiagram showing a portion of the pylorus. It was difficult to tell absolutely whether a pylorectomy had been performed when the gastrojejunostomy was done, but inasmuch as we found in the plate evidences of the pylorus, we concluded that the main difficulty was rather at the gastrojejunal orifice.

In addition to the disturbances which the patient had in his stomach, we found by injecting the colon with barium from below that there were binding adhesions in the descending colon which were the cause of the original pain in his left iliac fossa and which led to the unfortunate operation. We explained to the patient the nature of his difficulties, stating that it would be necessary to remove the adhesions which prevented his descending colon from properly emptying and filling, and that it would also be necessary before his health could be re-established to undo the gastrojejunostomy operation. We explained to him further that the opening was so great that his stomach no longer acted as a food reservoir, a digestive chamber, but immediately dumped its contents into the lesser bowel.

The patient left the hospital, but returned in a week, stating that he was ready to have the operation performed. He still complains of the burning in the epigastrium coming on immediately after eating, more or less constant pain through the whole of his abdomen, and a splashing noise which takes place when he drinks liquids. This splashing noise he also describes as a growling movement which becomes worse when he lies down at night.

Operation and Lecture by Dr. Andrews.—Gastric surgery is sometimes worse than a failure. Certain operations, unadvisedly performed, may result in very positive derangement of the digestive function not existent before.

We have a problem in this patient of undoing by operative interference the surgical work done on his digestive organs two years ago which has resulted disastrously to his digestion. He is progressively losing weight, and so far from being relieved by his surgical operation, has been in every way made worse by it.

We are accustomed to see failures follow indiscriminate gastric surgery. Sometimes a stoma is wrongly placed or is too small, or kinks and spurs and "vicious circle" or jejunal peptic ulcer render the work of no avail. Sometimes temporary benefit is followed by gradual recurrence from closure of the new stoma, especially if no pyloric exclusion is practised. Sometimes gastrojejunostomy is a failure because it never was so clearly a surgical indication as some other procedure, such as resection, pyloroplasty, or even dietary or medical treatment.

We see many such failures, and are often beseeched by suffering patients to restore them to their former condition by disconnecting and closing the false opening. It is rare, however, that we see so frank and imperative an indication for doing this as this man presents. It is an opportune time, therefore, to present some of our ideas as to the best technic for doing this as suggested by our experience.

I will say that the operative work is not difficult or tedious, and can be done by two contrasting methods which will be presently described, each of which has its advantages.

I will first describe the man's present condition and history leading up to it. Dr. C. L. Mix has carefully analyzed all his symptoms and finds evidence that the stomach has little digestive capacity. There is pain and anorexia, but not much vomiting. The fluoroscope and x-ray pictures are such as I never saw before. The stomach has such a large stoma into the bowel that it literally dumps its whole contents instantaneously. In other words, its retention is *nil*. No sooner is the barium meal swallowed and the table elevated than the whole meal escapes through the huge stoma which you see in the plate. Only by using the fluoroscope or photographic plate instantly or within thirty seconds can anything be seen in the stomach at all. Exactly the opposite fault is more often encountered, viz.: a tendency to spasmodic or organic closure of the stoma, so that the pylorus gets no relief. In fact, one of the most surprising things in gastric surgery is the way a stomach wall can close a false opening, temporarily or permanently retaining the stomach contents long enough for gastric digestion. Here the condition is reversed,

there being no semblance of sphincteric control over this large orifice. Hence I have applied the term “dumping stomach” to this, fortunately, rare deformity.

What shall we say of the pylorus itself? No trace of the pyloric cap is present, and we do not know whether the pylorus was excluded or resected or left alone. The precise form of operation we perform will depend upon this factor. If no pylorus remains, provision must be made in some way. If a normal one is found, we may hope entirely to close up the false opening which we suspect never was needed.

On opening the abdomen we see at once that there is a normal looking patulous pylorus with no adhesions or signs of pathology in gall-tracts or pancreas. On lifting the colon the transverse mesocolon can be separated from the point of anastomosis and both viscera seen and freed. The simple problem of severing this union and restoring the continuity of each hollow viscus is to be solved as nearly as possible by reversing the steps of a gastro-enterostomy. As you see, the same clamps can be used. No one can doubt the importance of sacrificing only the stomach wall, so as not to narrow the bowel by suturing and inversion. This means that the line of section should encroach about 1 cm. on stomach wall, leaving that much on the bowel side. You will note that the stomach mucosa is normally pink or gray in color and that the bowel mucosa is fiery red and inflamed. I have always noted this, and ascribe it to the irritating effect of the acid peptic juices. We cannot wonder that jejunal peptic ulcers sometimes form at this point. What we do not precisely know is how far along the intestine this disturbance follows. It is to be assumed that the mingling of normal alkaline duodenal fluids soon neutralize the acid just as they do below the pylorus. You will observe that I am doing this operation with the common rubber-covered stomach and bowel clamps, but it is proper to state that another technic is preferred by one of us (E. A.) who believes that a more cleanly and equally rapid method is to use two Mayo crushing clamps, exactly as in pylorectomy, cutting between them and sewing



Fig. 297.

with the usual double row on each viscus. Thus we may either use a “closed clamp” or an “open clamp” method.

While, of course, we regard resection as a more capital operation than gastro-enterostomy, it does not follow that the one step of division between clamps is any more severe or less rapid. In fact, as the number of these cases increases, as seems likely in the future, the “closed clamp” method may prove safer and more rapid. Even when the pylorus has been occluded it is not difficult by a plastic to reopen it.

Two very positive indications have been presented to us for closing gastro-enterostomy stomas:

1. “Dumping stomach.” We find no other term which will describe a postoperative condition in which the stomach has so large a stoma that it literally dumps its whole contents instantaneously into the bowel; in other words, its retaining power is *nil*. In one such case the fluoroscopic examination showed the whole barium meal falling through the stoma in thirty seconds. It was so nearly instantaneous that the tilting fluoroscopic table could hardly be raised quickly enough to observe or photograph any of the opaque mass still in the stomach. This patient had progressive emaciation, pain, and anorexia. Others have the same phenomena in less extreme degree.

2. Vicious circle and bile accumulation in the stomach causing persistent vomiting.

3. Finally, we have had to deal with neurotic and psychic individuals, persons with exalted reflex excitability, who imagine their jejunostomies have done them harm instead of good. This is the class we are reluctant to treat surgically without objective evidence of structural derangement. Some of them were physicians who have gone the rounds of many clinics. Some are neurasthenics who rush to any new idea offering prospect of relief. Not all such persons should be indulged in their obsessions.

Fig. 297.—Open clamp method: 1, Rubber-covered clamps on stomach and jejunum, stomach being severed about 1 cm. above its union to jejunum. 2, Marked difference in appearance of mucosa of stomach and jejunum. Note red and inflamed jejunal mucosa, while that of stomach is normal. 3, Mucosa of stomach stump has been closed by continuous running suture. Muscular and serous edges are being approximated by interrupted sutures.



Fig. 298.

Under these limitations it is fair to say that a considerable percentage of stomach cases will be found who have been made worse, not better, by "drainage" operation, and must have their surgical work undone before cure is possible. It is humiliating that in doing this we are only correcting surgical mistakes, but there is no want of candor or fairness in our attitude, since we admit that our own cases may be among those criticized.

Broadly speaking, when gastrojejunostomy has been a failure or an injury to the digestive functions, it may be assumed that it never was indicated. The best way to avoid additional mistakes is to insist upon prolonged and scientific analysis of all the factors in such cases in collaborations with internists and stomach specialists in a hospital. These cases are even more liable than ordinary ones to mistakes from hasty judgment and insufficient objective evidence or lack of proper laboratory tests.

The previous error should warn us to regard each case as carrying dangerous possibilities of further blunders. Eliminating all errors and doubtful cases, we still find a residue of proved examples of harm from faulty surgery. It is the purpose of this clinic to show operative steps as worked out in our clinic, and to demonstrate that the method is safe, rapid, and of unfailing benefit. The problem is the simple mechanical one of closing a false opening between two hollow viscera with or without separating them from each other in the quickest, most aseptic, and bloodless manner possible. We have been able to do this with three somewhat different types of operation:

1. Open clamp method or "reverse gastro-enterostomy."
2. Closed clamp method of angiotribe and cautery division.
3. "Stomaplasty."

1. "Reverse gastro-enterostomy" or open method (Fig. 297) was our first and is perhaps our best method on account of its mechanical fitness, speed, and safety. The steps are an exact

Fig. 298.—Closed clamp method: 1, Stomach divided between two crushing clamps about 1 cm. above union to jejunum. 2, Stump of stomach being closed by over-and-over suture. The raw edges are then infolded by a second suture. 3, Operation completed. The jejunum has been closed in the same manner as described in the open clamp method.



Fig. 299.

reversal of the ordinary gastrojejunostomy, with certain precautions to avoid stricture of the small bowel. After lifting the transverse colon and exposing the anastomosis, rubber-covered clamps are placed on each viscus; the whole problem is now so to disconnect and repair the jejunum as not to leave it strictured. This would be inevitable were one to divide the stoma along the old suture line and then close it by the ordinary inversion. To avoid this we make the section upon the stomach wall 1 cm. away from the line of anastomosis. This means that a cuff of stomach wall will be left entirely around the false opening in the bowel. The fact of sacrificing this amount of stomach wall is of no consequence, but the value of the cuff is apparent when we begin to close the jejunal defect, for this "cuff" of stomach wall is just sufficient to close it by inversion with no narrowing of its lumen.

2. Closed method (Fig. 298). As an alternative method, to make the operation more absolutely aseptic, one of us (Dr. E. A.) employed Péan clamps as in pylorectomy. This enables us to divide both organs without exposing the cavity of either. It is a sterile operation except along the cut edges. If we make the divisions with the cautery, or with the knife followed by the cautery, we have a technic theoretically more aseptic.

A practical difficulty was found in one case in the lack of available space for placing the two clamps. In other cases it was found easy of execution. It is easy, if necessary, to free the stoma line from the attachment to the mesocolon.

3. "Stomaplasty" (Fig. 299) or plastic closure of part of the stoma to reduce its size is indicated in some cases which have had pyloric obstruction either from disease or operation. We may have to choose between operation to restore the pylorus or to repair the stoma. It is a simple and easy procedure, but our experience is too limited for very positive conclusion as to value and permanency.

Fig. 299.—Stomaplasty: 1, Stomach and jejunum, held by rubber-covered clamps, are being partially separated by cutting along line of old union. 2, First row of continuous sutures being applied to close opening. 3, Completed result. Note reduced diameter of gastrojejunal opening.

Conclusions.—1. Closing safe and often indicated.

2. It should become a standardized operation, and will remain so as long as the indiscriminate use of gastrojejunostomy is persisted in as a cure-all for digestive trouble.

3. To avoid danger of even this becoming a routine in the hands of uncritical men.

4. Three methods: (a) Simple "reverse gastro-enterostomy," (b) exclusion by crushing clamp, cautery, etc., (c) plastic operations for partial closure of the false opening.

Postscript.—In a personal communication from the patient dated March 19, 1920 he writes, "I am walking a little easier every day and that is sure saying something for me. I am feeling fine and could not be any better with the exception of my bowels. They bother me some, but I think they will be all right in a short time, as they were overworked for a long time. My wound has been healed over for about two weeks now and is getting better every day. I can eat almost everything without any trouble or pain in my stomach. That sure is fine, to my notion. It seems to me as if I had been born over as a new man—no more of those exciting times in my bowels. I almost forgot to tell you I gained 20 pounds since I came home."

CLINIC OF DR. DAVID C. STRAUS

COOK COUNTY HOSPITAL

PERINEPHRITIC ABSCESS—TUBERCULOSIS OF KIDNEY —SUBCAPSULAR NEPHRECTOMY

Summary: Perinephritic abscess in a patient admitted to hospital with diagnosis of tuberculous peritonitis—drainage of pus collection. Post-operative cystoscopy, ureteral catheterization, and pyelography to determine presence of tuberculosis of kidney. Nephrectomy for tuberculosis of kidney—technic—significance of anomalous renal vessels—advantage in difficult nephrectomies of dividing ureter before attempting to expose and ligate renal vessels—treatment of ureter. Discussion on tuberculosis of kidney. Prognosis in present case.

THE case I desire to present this morning is one of unusual interest from the standpoint of diagnosis, surgical indications, and operative treatment.

The patient, P. J., a male laborer, twenty-seven years of age, came to my service transferred from the medical service of Dr. Charles Spencer Williamson. He was sent to the hospital by Dr. Ludwig Loeb, who had seen him on April 12 and 15, 1920. He consulted Dr. Loeb because of loss of appetite, loss of weight, and weakness. There were no other complaints except some indefinite abdominal discomfort; he had no pain anywhere. These symptoms began insidiously in December, 1919, without any apparent cause and were gradually progressive. It was chiefly because of the progressive loss of weight and strength that he became worried. The first time Dr. Loeb observed him his temperature was 99° F., and on the second visit it was 102.6° F. His abdomen also was rather distended, and there was some diffuse tenseness of the abdominal wall, with some slight indefinite abdominal discomfort, though no localized area of tenderness and no real pain. Dr. Loeb sent the patient to the Cook County Hospital, suspecting a possible tuberculous peritonitis.

On entrance into the hospital April 19, 1920 his chief complaints were loss of appetite, loss in weight, weakness, pain in the abdomen, expectoration, and fever. The diagnosis made in the admitting room was suspected pulmonary tuberculosis. In addition to the above facts in regard to the onset of his trouble he stated that last December his appetite became poor, but he kept at work until the middle of February, when he had pain in his limbs and joints, especially on motion. The joints were not red or swollen. This "rheumatism" lasted until the middle of March, when he began to have dull pain in the abdomen, which has been continuous since. The pain was not sharp, was not definitely located, and did not radiate. He had been confined to bed more or less continuously since the middle of February. He had been chronically constipated, but otherwise had not noticed any abnormality of his stools, never noticing any blood or mucus.

His previous history is negative except for the fact that he had typhoid fever eight years ago, and had his left testicle removed five years ago because of a discharging sinus. His habits have always been moderate and he denies ever having had any venereal infection. His family history is negative for tuberculosis.

Physical examination on admission showed the following as the more important findings: The patient was anemic looking, emaciated, and appeared weak. The head and neck showed no abnormal findings. Examination of the chest showed dulness over the entire right lower portion of the chest below the fifth rib, both anteriorly and posteriorly, and this dulness was continuous with a liver dulness. Harsh breath sounds were heard over the left and right apices. The right apex was contracted, the breath sounds were distant, and occasional dry râles were heard. The heart findings were entirely normal. Examination of the abdomen showed tenderness all over, but especially marked over the liver region, and the lower margin of the liver was one and one-half fingerbreadths below the costal arch. The spleen was not palpable. Neither kidney was palpable. Genital examination showed the absence of the left testicle. All extrem-

ities were emaciated, but were otherwise normal. All reflexes were normal. Blood-pressure was 110 systolic, 85 diastolic. Examination of the urine showed specific gravity 1014, reaction acid, albumin present in considerable amount, sugar absent. Microscopic examination showed the presence of hyaline, epithelial, and amyloid casts, many pus-cells, and an occasional red cell. An antiformin test was negative for acid-fast bacilli. Examination of the stool was entirely negative except for the presence of a positive Weber test. Antiformin tests of the stool were negative for acid-fast bacilli. A second stool examination gave the same findings. The first two stools gave a positive Weber test. In a third examination the Weber test was negative. Sputum examination showed total quantity scant, color gray, general appearance purulent. Microscopic examination showed the presence of leukocytes, various organisms, but no evidence of any tubercle bacilli. A blood count made the day of admission showed 16,000 leukocytes; another count made two days later showed 22,000. A differential count made the day of admission showed small mononuclear lymphocytes 5 per cent., large mononuclear lymphocytes 2 per cent., polymorphonuclear neutrophils 92 per cent. The temperature varied from 97° F. in the morning to 100° F. in the evening; the pulse varied between 92 and 120. The respirations varied between 20 and 30.

On April 20th the patient was sent to the x-ray department for roentgenologic examination of the chest for a suspected empyema. The report of Dr. Blaine reads: "No definite x-ray shadow evidence of an empyema is present. A slight clouding is seen in the right lower pulmonary area, which may be an early degree of such a lesion, but no accumulation of exudate is present at this time. It is noted that the height of the thorax is materially decreased, apparently by abdominal pressure. The right diaphragm is definitely higher than the left" (Fig. 300).

On April 22d a diagnostic puncture was made in the ninth intercostal space in the midaxillary line, with negative result. A second puncture was made in the tenth intercostal space about midway between the scapular line and the vertebral column, directing the needle downward; 2 cm. of thick pus were aspirated.



Fig. 300.—Roentgenogram of chest and upper abdomen taken April 20th, while patient was still on the medical service, to rule out a suspected empyema and determine, if possible, the cause of the dulness in the lower portion of the right chest. The dulness was continuous with the liver dulness and extended up as high as the fifth rib both anteriorly and posteriorly. No evidence of empyema is present. The height of the thorax is materially decreased on both sides, apparently due to abdominal pressure. The right diaphragm (*D*) is definitely higher than the left (*D'*). Note the localized dense shadow immediately below the medial half of the right diaphragm occupying an area more or less elliptic in outline extending from about the middle of the diaphragm to the spine. The right phrenicocostal sinus (*P*) is clear—no evidence of fluid.

Examination of a direct smear showed no organisms in the pus, and a stain for tubercle bacilli was negative. Cultures also were sterile.

On April 24th the patient felt weaker, had dull pain over the right side of the lower chest. This pain was increased on deep inspiration. His appetite was very poor and he appeared very septic. A diagnosis of subphrenic abscess was made and the patient transferred to my surgical service.

When I first saw the patient the findings were about the same as those recorded in the medical department.

As the patient's condition was such that immediate drainage seemed indicated, it was deemed wisest to resort to operation at once rather than to delay in attempting to make a refined diagnosis as to the exact etiology of the pus collection. In a recent clinic¹ I discussed in detail the various possibilities as to the location of pus collections beneath the diaphragm and the source of the infection in the case of right and left subdiaphragmatic abscesses, so that I will not go over these again in detail. In this case it was impossible from the clinical examination or the roentgenologic findings (Fig. 300) to determine with certainty whether the pus was located in the subdiaphragmatic space, in the liver, or in the retroperitoneal tissues about the kidney.

The condition was believed to be either a liver abscess or a subdiaphragmatic abscess either from a liver abscess or from a low-grade appendical abscess, or a perinephritic abscess from a tuberculous kidney; possibly, but much less likely, a tuberculous abscess from a spinal caries. The fact that the pus removed on puncture was sterile suggested either a tuberculosis of the kidney or bone, or an amebic liver abscess, and rather definitely spoke against a subphrenic abscess from a perforative appendicitis. Furthermore, there was no history or findings suggestive of an appendical lesion.

The diagnosis of perinephritic abscess secondary to tuberculosis of the kidney was seriously considered for the following

¹ Subdiaphragmatic Abscess—Transpleural Drainage of a Case Due to Abscess of the Liver, *The Surgical Clinics of Chicago*, 1920, pp. 377-400.

reasons: The location of the increased density in the roentgenogram (Fig. 300) being near the median line and rather well circumscribed, seemed suggestive, though its high location and the extremely high position of the diaphragm seemed unusual for a subphrenic abscess secondary to a perinephritic abscess. The fact that the pus removed by aspiration was sterile also suggested tuberculosis, although the site from which it was aspirated left one in doubt as to whether it might have come from a perinephritic abscess, an abscess of the liver, or a subphrenic abscess. Also the finding in the urine of albumin, pus, and blood suggested tuberculosis of the kidney. However, the absence of tubercle bacilli in the urine and the presence in the urine of epithelial, granular, and amyloid casts, which are not ordinarily present in tuberculosis of the kidney unless there is an associated nephritis, which is unusual, made it impossible to determine whether the urinary findings were due to pathology primarily in the kidney itself or were secondary to pathology elsewhere. Of course, we know that the absence of tubercle bacilli in the urine does not at all rule out tuberculosis of the kidney, for they may be present in certain specimens of urine and absent in others, or in cases where the ureter is obstructed the only urine passed may be from the healthy kidney. Other facts pointing toward a diagnosis of tuberculosis of the kidney were the retraction of the left apex, which was very suggestive of an old pulmonary tuberculosis and the probability that the discharging fistula in the scrotum was due to tuberculosis of the testicle, and it was because of this that the testicle was removed. Furthermore, the "rheumatism" that the patient described as having had in his limbs and joints was extremely characteristic of a tuberculous rheumatism, in that it came on without any apparent cause last February, was so severe that it compelled him to stop work and remain in bed until the middle of March, and at the same time the joints showed no objective findings, being neither red nor swollen, and finally, that it disappeared as suddenly as it came on.

A French clinician, Poncet, first described this condition in 1896, and called it "rheumatisme tuberculeux." He pointed

out that it differs from an ordinary joint tuberculosis, that it does not show the usual anatomic changes of tuberculous arthritis. He believed it to be a tuberculous polyarthritis due either to the presence in the joint of a very few tubercle bacilli or tuberculous toxins. When the rheumatism is caused by the presence in the joint of a very few tubercle bacilli he assumed that these are of such low virulence and are so few in number that they are unable to call forth the usual specific tuberculous changes in the joint. When the condition is due to the presence of a toxin produced by tubercle bacilli elsewhere, this reaches the joint through the blood-stream and causes local changes which differ from an ordinary tuberculous arthritis. While a few tubercle bacilli have been found in the joints in some of these cases, it is now generally assumed that the rheumatism is ordinarily due to the presence of toxins alone; that it is a toxic polyarthritis. Clinically, this tuberculous rheumatism may run either an acute or chronic course. Several subtypes are described. One of the acute types, tuberculous arthralgia, corresponds exactly to the symptoms this patient described. It commences without apparent cause as vague drawing pains, particularly in the larger joints, is aggravated by motion, and is characterized by the absence of any objective findings, such as redness or swelling of the joints, and by the fact that it disappears as it comes on without any apparent cause. It travels from joint to joint and, as a rule, several joints are affected simultaneously.

While the above facts made us think strongly of the possibility of a perinephritic abscess secondary to tuberculosis of the kidney, however, the absence of any bladder symptoms, frequency, incontinence, pain, etc., the absence of any pain in the region of the kidney, and the absence of any tenderness over the kidney rather spoke against tuberculosis of the kidney, and the extremely high position of the diaphragm and liver made us suspect that we were probably dealing with a primary condition in the liver.

Although the patient did not give a history of any previous attack of dysentery, we believed it was very likely that we were dealing with a case of amebic liver abscess. We know that not infrequently an amebic liver abscess may follow long after an

attack of amebic dysentery, which was so slight that the patient had forgotten it. The extremely insidious onset, dating back to last December, the absence of any symptoms except loss of appetite, loss of weight, and weakness, together with a leukocytosis of 22,000, and enlargement of the liver upward as high as the fifth rib anteriorly and posteriorly, together with tenderness on pressure over the liver area, and the low irregular fever made the diagnosis of liver abscess seem most probable. Furthermore, the fact that no tubercle bacilli were found in the urine rather spoke against the diagnosis of tuberculosis of the kidney, although, as I pointed out before, these need not always be found present in the urine at any particular examination, or even on repeated examinations in case there is a stricture of the ureter. As against the diagnosis of amebic abscess of the liver it was realized that amebic abscess rarely occurs in the lower posterior portion of the right lobe near the median line. You will remember that we considered in detail the location of amebic liver abscess in the clinic I referred to before. But, on the other hand, it is most unusual for a perinephritic abscess to show such a high position of the diaphragm. A tuberculous abscess due to a tuberculosis of the spine (Pott's disease) was also considered, but the fact that there was no rigidity of the spine and no tenderness on pressure over the vertebra rather ruled this out. As against a perinephritic abscess, although by no means ruling it out, were the facts that the right kidney was not palpable, that there was no tenderness on pressure over the kidney area, and that there was no edema of the soft parts in this area. We know, however, that in tuberculosis of the kidney the findings on palpation vary widely in different cases. Early, before any perinephritic adhesions have occurred, the kidney is often felt to be enlarged, shows respiratory mobility, and on deep inspiration can be ballotted. Later, if perinephritic adhesions have occurred, and these very often develop about the upper pole, fixing the kidney high up, the kidney may no longer be palpable, even on deep inspiration and even though it is definitely enlarged.

Had the patient's general condition warranted the delay required I would have had the patient examined cystoscopically,

the bladder and ureteral orifices examined, ureteral catheterization performed, and the urine from each kidney separately examined, chemically and microscopically, the usual functional tests made, and a pyelogram made of each kidney. But as the patient's condition had grown progressively worse during his short stay in the hospital and as the site of the pus had been determined, it seemed imperative to drain the abscess without delay and determine the cause of the abscess at operation, if possible, or else postpone the determination of the exact etiologic factor until the patient's general condition would warrant the necessary examinations. Accordingly, preparations were made to operate the patient the following morning.

Operation (April 26, 1920).—As the pus aspirated by the medical department had been recovered from a puncture made in the tenth right intercostal space at a point about midway between the scapular line and the line of the spinous processes of the vertebræ, directing the needle somewhat downward, and as the local findings had not changed, as soon as the patient was anesthetized I made a diagnostic puncture in the eleventh intercostal space directly below the point of the previous puncture. With the needle directed perpendicularly to the skin no pus was encountered. Accordingly, the needle was next directed downward, and at a depth of perhaps $2\frac{1}{2}$ inches pus was at once encountered. An assistant was directed to hold the needle in place. Believing that if the pus was in the subphrenic space or in the liver itself the abscess could be reached parapleurally, that is, by going below the pleura and then through the diaphragm, I decided to resect the twelfth rib, lift the pleura upward, and then go through the diaphragm. Accordingly, an incision was made along the twelfth rib from just lateral to the erector spinæ muscle to its extremity, cutting directly down upon the rib, boldly cutting through the overlying muscles. The twelfth rib was then completely resected, subperiosteally, from its extremity to within a few centimeters of the spine. Next, at a point near the erector spinæ muscle and well below the pleural reflection, a diagnostic puncture was made, pus encountered, and then an incision made down through the overlying soft parts until the abscess cavity

was reached. There was considerable edema of the deep tissues and these were so adherent to one another and altered by inflammatory changes that it was impossible to determine their exact identity, and this was not long attempted. No suggestion of perinephritic fat was encountered. The right index-finger was now introduced into the abscess cavity, several septa present in its lower portion were broken down, and the entire abscess was converted into a single simple cavity. This was about the size of a goose-egg and its long axis was vertical, as was indicated by the dense shadow in the roentgenogram (Fig. 300). The abscess cavity extended almost to the median line, in front of the spinal column, just as the x -ray plate had indicated (Fig. 300). Its walls were smooth, except below, where the septa had been encountered. Careful palpation failed to show any suggestion of an osseous focus in the vertebræ and no rough bone was to be felt. A tuberculous bone focus with a resulting psoas abscess had been considered, but could not be made out. The cavity contained several ounces of thick, slightly greenish-yellow pus, which had a foul penetrating odor, reminding one of a colon infection. A sample of pus was sent to the laboratory for smear, culture, and inoculation into a guinea-pig. The abscess cavity was now sponged dry. Its walls were seen to be of a brown color, and it was impossible to be certain whether the abscess was in the liver itself or whether the lower roughened part of the cavity consisted of kidney tissue. Accordingly, a section of the wall of this lower portion of the abscess cavity was removed for microscopic study.

The cavity, now being sponged dry, was swabbed out with tincture of iodine and then irrigated with normal saline solution. A large rubber drainage-tube was then inserted down into the bottom of the cavity and was held in place by suturing it to the skin by a single silkworm-gut suture. Two silkworm-gut sutures were inserted through the skin and underlying soft parts, but were not tied, it being planned to tie these ligatures when drainage was no longer indicated. Plain gauze packing was loosely introduced about the rubber drain to hold this in place and, further, to prevent the walls of the abscess from closing. Dry

dressings were applied. The patient left the table in good condition.

The exact etiology of the abscess could not be determined at operation, but it was believed that this would be possible when the reports from the smear, culture, guinea-pig inoculation, and tissue examination were returned. Unfortunately, the piece of tissue removed for examination was lost.

Following the operation the patient's general condition improved, he was more comfortable, and had a better appetite. However, he still ran an irregular temperature, though this did not rise as high as it did before the abscess was drained. Also there was less abdominal discomfort, but he still had some distress from tympanites. On April 29th, five days after the operation, the leukocyte count was 22,000, just the same as it has been before the abscess was drained. By May 7th the leukocyte count had come down to 15,000 and a differential count showed polymorphonuclear neutrophils were now 90 per cent. By May 15th the leukocyte count had fallen to 9400, and a differential count showed that the polymorphonuclear neutrophils had fallen to 80 per cent.

When the patient's condition had improved sufficiently to warrant further diagnostic examinations he was sent to the x-ray department to determine whether there were any changes in the local findings, and in particular to study the liver and diaphragm. The report returned by Dr. Blaine reads: "The right diaphragm as well as the left diaphragm are seen to be very high, reducing the height of the chest and causing a transverse position of the heart. The pulmonary areas are negative." This corresponded to our clinical findings, and seemed to be chiefly due to the tympanites.

As the patient's general condition now seemed sufficiently improved to warrant a cystoscopic study, this was ordered, because I still considered the possibility of a perinephritic abscess secondary to a tuberculosis of the kidney.

The first cystoscopic examination showed that there were no abnormal findings in the bladder except that the right ureteral orifice gaped somewhat. A shadowgraph ureteral catheter was

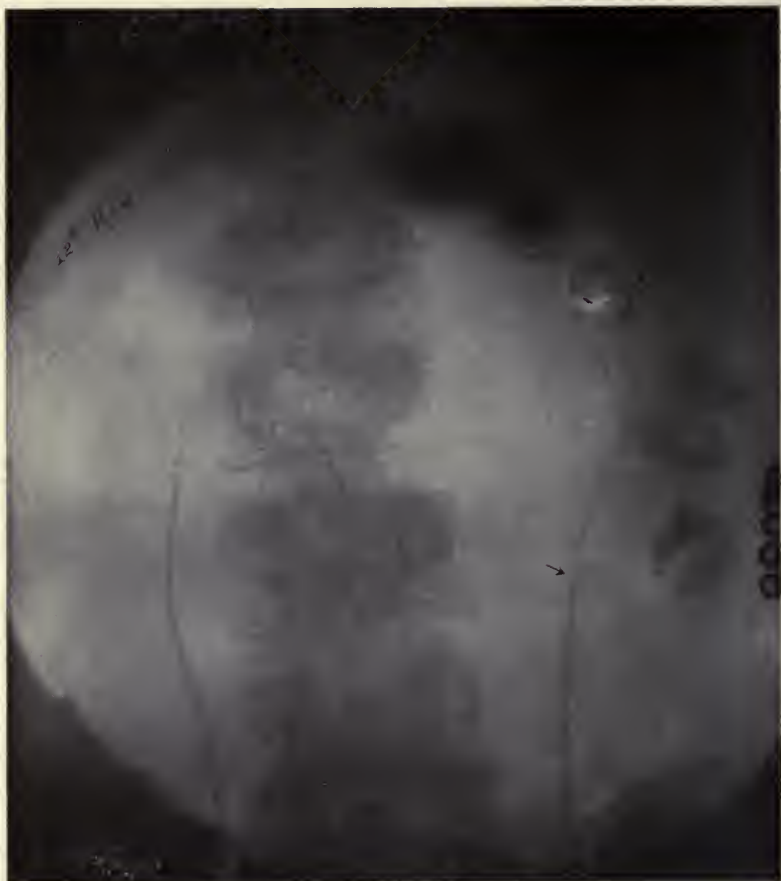


Fig. 301.—Pyelogram of right kidney with roentgenogram showing ureteral catheters in both ureters. A shadowgraph catheter is seen inserted in the left ureter. The tip of this catheter has reached the usual height, indicating the position of this kidney to be normal. No opaque solution is seen on this side. On the right side the wax catheter can be more faintly seen. Its tip reaches only about as high as the lower pole of the right kidney, as indicated by the arrow. Above this the greatly narrowed ureter is seen to be filled with opaque solution, which appears as a fine line of irregular width and leads up to the renal pelvis. This, similarly, is seen reduced to a narrow line of irregular width, and from it fine lines radiate to several isolated, large, more or less circular collections of opaque media, corresponding to and typical of abscess cavities in the kidney. From the upper one of these abscess cavities a line of opaque media leads to the region immediately above the kidney, where the majority of opaque media injected has collected in a more or less circular cavity at the height of the

easily inserted up to the pelvis of the left kidney, but a similar catheter introduced into the right ureter met an obstruction that could not be passed.

The patient was returned for a second ureteral catheterization, but here, again, it was impossible to introduce the right ureteral catheter up to the renal pelvis, and no urine came away through this catheter.

He was returned for a third ureteral catheterization on May 22d. Here, again, the first two attempts to pass the obstruction in the right ureter were unsuccessful, but finally a wax ureteral catheter was passed beyond the obstruction, although it could not be introduced as far as the renal pelvis, due to an apparent marked narrowing of this upper portion of the ureter. A shadowgraph catheter was now introduced into the left ureter as far as the renal pelvis.

Ten c.c. of silver iodid were now injected through the wax catheter in the right ureter and a roentgenogram, including both kidneys and ureters, was taken.

This plate (Fig. 301) shows most graphically the pathologic conditions present.

A shadowgraph is seen inserted in the left ureter. The tip of this catheter has reached the usual height, indicating the position of this kidney to be normal. No opaque solution is seen on this side.

On the right side the wax catheter can be more faintly seen. Its tip reaches only about as high as the lower pole of the right kidney as indicated by the arrow. Above this the greatly narrowed ureter is seen filled with opaque solution, which appears as a fine line of irregular width and leads up to the renal

twelfth rib and in contact with the twelfth thoracic vertebra. The safety-pin passing through the rubber drainage-tube introduced into the abscess cavity at the time of operation overlies this collection, so that it is perfectly apparent that this was the abscess drained at the operation and that it was a perinephritic abscess secondary to a pathologic kidney, in all probability a cavernous tuberculosis of the kidney. Note the presence of the twelfth rib on the left side and the absence of the twelfth rib on the right side, this having been resected at operation. No pathology is noted in the twelfth thoracic or the lumbar vertebra.

pelvis. This, similarly, is seen reduced to a narrow line of irregular width, and from it fine lines radiate to several isolated large, more or less circular collections of opaque media, corresponding to and typical of abscess cavities in the kidney. From the upper one of these abscess cavities a line of opaque media leads to the region immediately above the kidney, where the majority of the opaque media injected has collected in a more or less oval cavity at the height of the twelfth rib and in contact with the twelfth thoracic vertebra. The safety-pin passing through the rubber drainage-tube introduced into the abscess cavity at the time of operation overlies this collection, so that it is perfectly apparent that this was the abscess drained at the operation, and that it was a perinephritic abscess secondary to a pathologic kidney—in all probability a cavernous tuberculosis of the kidney. The roentgenogram also shows the presence of the twelfth rib on the left side and the absence of the twelfth rib on the right side, this having been resected at the first operation. No pathology is noted in the twelfth thoracic or the lumbar vertebra.

A urinalysis made on May 17th showed specific gravity 1020, reaction acid, albumin present, no sugar; and a centrifuged specimen showed a few granular and hyaline casts, pus-cells, and an occasional red cell.

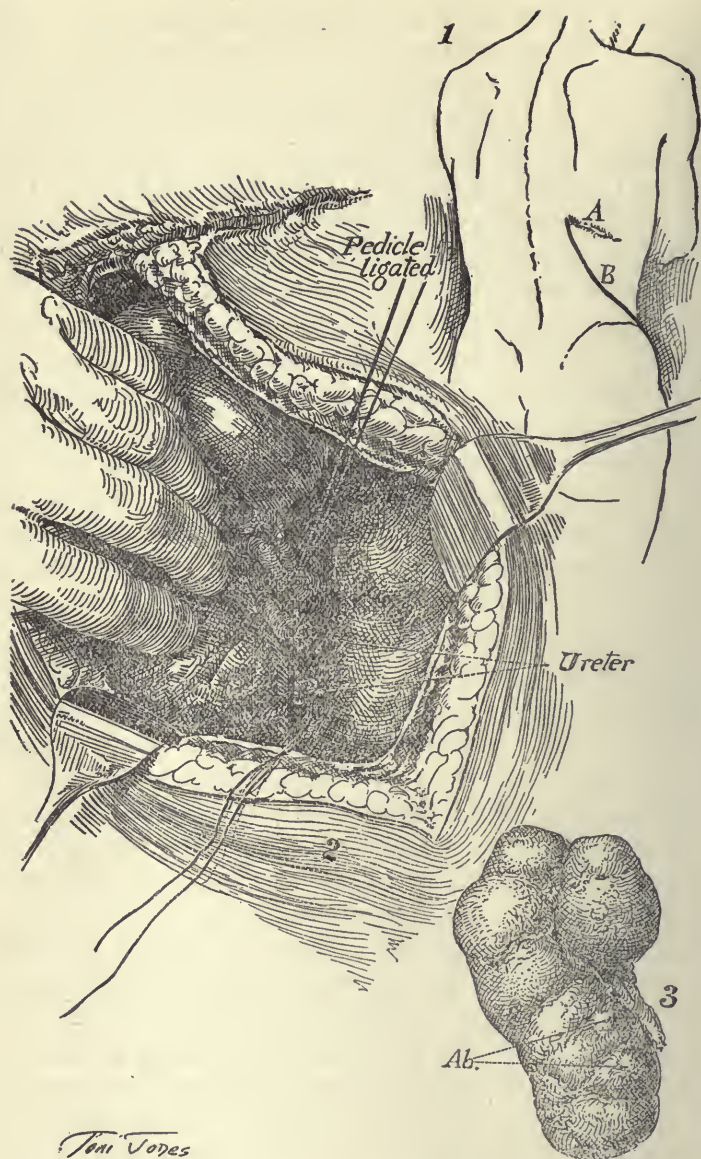
Ever since the time of operation considerable pus had been draining from the drainage-tube introduced at that operation.

As it was clear that the right kidney was a severely damaged pus kidney, riddled with large abscesses, the indication was unquestionable to remove it at once. Accordingly, this was arranged for and carried out on May 26, 1920.

Second Operation: Nephrectomy.—With the patient lying on his left side, and with the special kidney elevator attached to the operating table elevated to its full extent, so as to widen as much as possible the space between the last rib and the crest of the ilium on the affected side, an incision was made from the medial extremity of the old incision, over the twelfth rib, at the outer border of the erector spinæ muscles, outward and down-

ward, toward and almost to the anterior superior spine of the ilium (Fig. 302, 1), cutting carefully down to the muscles and lumbar fascia until the kidney was reached. No perirenal fat was present. The kidney was firmly adherent everywhere to the surrounding structures. Then cutting the kidney capsule from one pole to the other, the line of the incision being just posterior to the lateral convex border of the kidney, the capsule was shelled off the anterior surface of the kidney, and then from the posterior surface by blunt dissection with the finger. Due to the long-standing infection and perinephritic abscess which had been drained at the primary operation, the capsule of the kidney was greatly thickened and was firmly adherent to the surrounding structures, and in particular to the peritoneum over the ascending colon (Fig. 302, 2). Great care was exercised not to open into the peritoneal cavity, and this was not done. On exposing the kidney tissue by reflecting the capsule, its surface showed here and there small miliary abscesses. In addition, it was seen that at the primary operation one large abscess at the upper pole had been opened and drained. This was clearly where the disease had perforated the kidney, causing the perinephritic abscess. The entire kidney showed a lobulated formation, reminding one of fetal lobulation, but it was clear from the roentgenogram (Fig. 301) that this was caused by the presence within the kidney of a linear series of large abscesses. By carefully continuing the subcapsular exposure (Fig. 302, 2), first the upper and then the lower pole was freed, attention being directed to find any polar vessels, but none were present. In the performance of nephrectomy, no matter by what method or route, it is important to remember the great frequency with which anomalous renal arteries are found, either at the upper or lower pole. Only too often operators, failing to notice or control bleeding from these vessels, which they have torn because they have not recalled their presence, have been embarrassed by very serious and even fatal hemorrhages. In a study of the kidneys in 100 cadavers—*i. e.*, 200 kidneys—to observe the frequency of accessory renal arteries Dr. Eisendrath and I¹

¹ Jour. Amer. Med. Assoc., October 15, 1910, vol. lv, pp. 1375-1377.



Toni Jones

Fig. 302.—1, Diagram showing (A) the incision made at the first operation, through which the twelfth rib was resected subperiosteally and the pus collection was drained; (B) incision made at second operation for nephrectomy. 2, Diagram showing technic of subcapsular nephrectomy which is indicated

found true accessory arteries in 14 per cent. of the cases. The accessory renal arteries were found as follows:

	In 200 kidneys.
Accessory arteries (true).....	28, or 14 per cent.
Superior polar arteries from a single renal (pseudo-accessory).....	19, or 9.5 per cent.

The following types of true accessory arteries were found:

	In 200 kidneys.
Two separate arteries from aorta to hilus.....	14, or 7 per cent.
Inferior polar artery directly from aorta.....	7, or 3.5 per cent.
Superior polar artery directly from aorta.....	5, or 2.5 per cent.
Four renals directly from aorta.....	1, or 0.5 per cent.
Inferior polar artery directly from left common iliac ..	1, or 0.5 per cent.

Dr. Eisendrath¹ has recently reported the findings in 218 additional kidneys. This makes a total of 1237 kidneys examined by various investigators up to date, showing that true accessory renal arteries occurred as follows:

	Per cent.
Upper polars from aorta.....	0.5
Lower polars from aorta.....	nearly 0.6
Lower polars from iliacs.....	.04
Superior polar arteries from a single renal (pseudo-accessory—in 418 kidneys).....	16

Having freed the two poles, the ureter was next sought and found. It was greatly enlarged, especially near the pelvis, and

when the capsule is firmly adherent to surrounding structures. Note that the kidney has been shelled out from its capsule, which remains *in situ*. Note also that the kidney cannot be drawn out through the operative incision, so that the entire operation has to be performed in the depths of the wound. After doubly ligating and dividing the ureter the vascular pedicle can be more easily exposed and is ligated *en masse*. A clamp is then applied between the ligatures and the hilus and the vascular pedicle divided. The kidney is now removed, and the stump of the ureter is stitched into the lower angle of the wound. 3, Drawing of kidney removed at operation. Note that the kidney is devoid of its fibrous capsule except near the hilus. Note also that the kidney, which was somewhat enlarged, shows a lobular contour reminding one of fetal lobulation. This appearance is due to the localized bulging of the surface caused by the caseous, cavernous tuberculous abscesses within, shown in Fig. 303. Several subcapsular abscesses (*Ab.*) are plainly to be seen.

¹ D. N. Eisendrath: *Annals of Surgery*, lxxi, No. 6, pp. 726-743, June, 1920.

its walls were very greatly thickened. The ureter was now doubly clamped near the lower angle of the incision, ligated doubly with chromic catgut, and divided between the ligatures (Fig. 302, 2). The cut surface showed that its lumen was greatly narrowed (Fig. 302, 2).

Probably the best method of dividing the ureter is by means of an actual cautery, because it accomplishes at the same time sterilization of the lumen, and thus guards against infection of the wound. In this case it was not deemed indicated, as he already had a large abscess around the kidney from escaped kidney contents.

I would like to call your attention at this time to the great advantage in any case of difficult nephrectomy of dividing the ureter before attempting to expose and ligate the renal vessels. When the ureter is divided the kidney has a greatly increased range of mobility, and it is far easier now to take care of the vascular pedicle. Next, attention was directed to expose the hilus and the renal vessels, and when these had been well exposed the vascular pedicle composed of the renal arteries and veins was ligated *en masse*, using No. 3 chromic catgut. A second similar *en masse* ligature was then applied. A curved clamp was applied proximal to the ligatures and the vascular pedicle divided. The hemostasis was absolute. Next the stump of the ureter was followed down with the finger to the bladder, care being taken not to separate it too freely from the surrounding tissues so as to interfere with its blood-supply, but no collection of pus came upon anywhere. Then the ureteral stump was stitched to the lower angle of the wound, so that any discharge later might be well drained away.

The question of the treatment of the ureter has been the subject of considerable discussion, especially in the past. At one time it was deemed advisable to resect the ureter close to the bladder, as it was believed that in this way any late complications on the part of the ureter would thus be prevented most effectually. Experience, however, did not prove this to be the case. It did not prevent the development of the occasional postoperative fistula and was accompanied by a higher

primary mortality. It is now generally abandoned. Since that time most surgeons treat the ureteral stump by merely stitching it into the lower angle of the incision, just as I did, so that it lies easily accessible for future local treatment in case this should become necessary. At the time of operation some surgeons attempt to cauterize the entire ureteral mucous membrane by means of injecting caustics, such as pure phenol, or by swabbing it out with phenol by means of a small applicator attached to a long sound. In addition to this method Kümmell sometimes uses an actual cautery to destroy the lining mucous membrane, and he has had a special long, delicate cautery point constructed for this purpose. He introduces the cautery into the ureter cold, then has the electric current turned on, and when the cautery has become hot slowly withdraws it. He also uses this method for the treatment of stubborn postoperative tuberculous ureteral fistulæ. Clinical experience has shown, however, that when once the tuberculous kidney has been removed the local disease in the ureter tends, as a rule, to heal spontaneously. Kümmell sutures the stump of the ureter into a separate stab incision in the abdominal wall, made slightly medially and below the incision through which the kidney has been removed, with or without complete closure of this original incision.

As much of the renal capsule as could be easily cut away was removed, but the major part remained behind. The cavity was now cleaned of blood and remains of renal pus, and then swabbed out with iodine. An iodoform gauze drain was inserted in the upper angle of the wound, another placed in the lower angle, and a rolled gutta-percha drain placed along the ureter, reaching almost to the bladder, bleeders ligated, and the wound closed up to the drains, using a few interrupted chromic catgut sutures for the deeper layers and lumbar fascia, and then several interrupted silkworm-gut stitches going through the skin, muscles, and fascial layers. Dry dressings were applied. The patient left the table in very fair condition. He was given 1000 c.c. of normal saline solution subcutaneously below the breasts during the course of the operation, and another 1000 c.c. were ordered given as soon as he reached the recovery ward.

The kidney (Figs. 302, 3, 303) is somewhat larger than normal, shows lobulation suggestive of fetal lobulation, but which is due to the distention of the contained abscesses, is almost com-



Fig. 303.—Drawing of kidney cut open. This shows typical caseous, cavernous tuberculosis of the kidney. The kidney is somewhat enlarged, and shows a picture reminding one of fetal lobulation, but this is the result of the large discrete abscesses within the kidney. These abscesses are almost filled with caseous tuberculous material, in part also by fat which has grown in. The cortex of the kidney is greatly thinned over the abscess cavities. The site of perforation is seen at *A*, where the abscess at the upper pole eroded through the cortex, resulting in the perinephritic abscess. The renal pelvis (*B*) is extremely narrow and is surrounded by old sclerotic connective tissue. The findings correspond exactly to those shown in the roentgenogram (Fig. 301).

pletely stripped of its capsule except near the hilus. Its surface is smooth for the most part, though here and there larger and smaller subcapsular abscesses are seen as yellow spots standing out in marked contrast to the general dusky red color of the main

portion of the cortex. On section the cortex is seen to be greatly thinned and the parenchyma is replaced by a series of large abscess cavities, typical caseous, cavernous, tuberculous abscesses. These large cavities are for the most part filled with caseous material, though some of them are partly filled by fat which has grown in. The pelvis shows its walls to be very greatly thickened and its lumen is reduced to a mere slit, which is no larger in caliber than the upper portion of the strictured ureter (see Fig. 301).

A section of the kidney was sent to the laboratory for histologic study and the report returned is as follows:

"Microscopic preparations stained with hematoxylin and eosin. This kidney presents typical tubercles with giant-cells and infiltrating mononuclears. In acid-fast preparations the bacillus of tuberculosis is demonstrated in these tubercles. (Signed) Stangl."

The patient's condition following operation has gradually but progressively improved, and he no longer complains of the constipation and tympanites that formerly distressed him almost continuously, and was his chief complaint in addition to his loss of appetite, weight, and strength.

No doubt you are all aware that tuberculosis of the kidney may first manifest itself clinically in one of the six following ways:

The most frequent type of onset is with slowly developing loss of strength, loss of weight, almost always accompanied by emaciation and characterized by the *insidious onset and progressively increasing bladder disturbances*. The bladder is irritable and there is an increased frequency of the desire to urinate, especially at night. When this frequency has once become established it rapidly becomes worse, and in case the desire to urinate is not promptly gratified, cramping bladder pains set in. Gradually, emptying the bladder becomes painful and there is a severe burning pain at the beginning and even more at the end of micturition. The latter often continues for some time after the completion of the act, accompanied by a feeling of cramp-like pressing in the bladder, as if some urine remained behind which ought to be expelled. Incontinence of urine, especially at night,

is often present in this type of onset; indeed, it may be the very first symptom of a renal tuberculosis. This occurs particularly in children, but also often in adults. Whenever one has to deal with a case of incontinence of urine it is essential to consider tuberculosis of the kidney. The commonest bladder symptom in this type of onset is the decreased capacity of the bladder. In case a patient with this type of onset is treated under the diagnosis of an ordinary cystitis, one is struck by the fact that the bladder shows an unusual irritability to distention with fluid, is extremely tender on contact with any instrument introduced, and quite conspicuously in contrast to an ordinary cystitis, which usually shows a decrease in symptoms following irrigations with a mild silver nitrate solution, the bladder is extremely irritable to even the mildest silver nitrate solutions. This decreased capacity of the bladder is not always the result of anatomic changes in the bladder wall, but in some cases is the result of the reflex action of the diseased kidney on the intact bladder. This type of onset with bladder symptoms is the most characteristic and occurs according to various observers in from 40 to 60 per cent. of the cases. Any case which is being treated as one of ordinary cystitis, which does not promptly respond to the usual general and local treatment, should make us suspect tuberculosis of the kidney. One should then feel compelled to carry out the usual diagnostic procedures—cystoscopy, ureteral catheterization, etc. When the local treatment seems to aggravate rather than diminish the bladder symptoms, it should make us particularly suspect tuberculosis of the kidney. When one has to deal with an ordinary case of cystitis a smear made from the sediment of a centrifuged specimen of urine will usually show the presence of the ordinary pyogenic organisms. In case no organisms at all are found, or only bacilli, and especially if these are found to be acid fast by the usual carbolfuchsin stain, it is essential to carry out ureteral catheterization and the usual examinations of the urine from each kidney separately—microscopic, chemical, functional tests, guinea-pig inoculations, etc.

The *second most frequent type of onset* is that in which there are

local symptoms on the part of the kidney. This type of onset also occurs, according to various observers, in from 40 to 60 per cent. of the cases, though this type of onset probably is not so common as the one just described. Wildbolz¹ found this type of onset in 43 per cent. of his cases.

These symptoms on the part of the kidney consist of a dull, aching pain in the kidney, colicky pains, and tenderness on pressure. The pains may remain limited to the kidney for a long time, or even always. As a rule, however, they are followed after a longer or shorter time by bladder symptoms, as those just mentioned. As a rule the kidney symptoms develop slowly and progressively, more rarely with great severity. Ordinarily the patient first complains of dull, drawing pains in the affected kidney, and these are unrelated to exercise or jarring of the body, in contrast to the pain caused by renal calculi. Gradually the intensity and frequency of the pain increases. It often assumes a neuralgic character. In case the symptoms set in acutely it is usually in the form of severe, colicky attacks, simulating a renal colic due to stone, and like it, the pain often radiates downward along the ureter toward the bladder, and at times also to the external genitalia. Such colicky attacks are often caused by a momentary obstruction of the ureter by blood coagula or masses of caseated detritus. These colics may recur at longer or shorter intervals and may accompany the dull localized pains just referred to. Küttner has taught that the urine should be examined for tubercle bacilli in every case of renal colic, and this teaching is well founded when one considers the frequency with which tuberculosis of the kidney is accompanied by renal colic.

Tenderness on pressure over the kidney is an important symptom in this type of onset. A tuberculous kidney may often show no changes on palpation. Early in the disease the kidney is not enlarged, but later some enlargement almost always occurs. For this reason it is often easily palpable in the hypochondrium, especially on deep inspiration. However, if, as often occurs, perinephritic adhesions develop early, and these most commonly

¹ Wildbolz: *Chirurgie der Nierentuberkulose*, Neue Deutsche Chirurgie, Band 6, 1913.

occur about the superior pole, the kidney may be held high upward, and it is not palpable even on deep inspiration. Even if the kidney is not palpable, pressure by the palpating hand causes pain. This tenderness on pressure is particularly marked over the renal pelvis and often elicits a painful desire to urinate. This tenderness of the kidney to pressure often elicits itself as a definite tenseness of the abdominal wall, and this latter may rarely be the only local expression of the disease of the kidney, just as occurred in this patient. But it must be remembered that at times all the above local kidney symptoms may develop in the healthy kidney. The enlargement and tenderness on pressure may be the result of a compensatory hypertrophy of the healthy kidney. The enlargement may be so great that the kidney may be easily palpable, and this rapid enlargement may be associated with considerable tension of its fibrous capsule, so that the kidney may be tender on pressure. Furthermore, colicky pains may be limited to the healthy kidney, either as a result of compensatory hypertrophic changes in the healthy kidney, or as a result of reflex pains referred from the diseased to the healthy kidney, just as occasionally occurs in the case of renal colic due to stone in the kidney. At times stones may be found in the tuberculous kidney and the colics may in these cases be attributed to the presence of a stone.

In addition to the excretion in the urine of albumin, pus, and blood, there may be the symptoms of a nephritis, with the excretion, in addition to the foregoing, of epithelial and granular casts, just as occurred in this case. But these symptoms of nephritis are unusual in tuberculosis of the kidney. Dieulafoy reported that he saw only 2 or 3 deaths from nephritis in 300 patients suffering with tuberculosis of the kidney, and Wildbolz observed only 2 cases of nephritis in 260 patients suffering with tuberculosis of the kidney. As I mentioned before, it was the finding in the urine of epithelial, granular, and amyloid casts in addition to the absence of any bladder symptoms or tenderness over the kidney that made me suspect that we were dealing with some condition in the liver rather than with tuberculosis of the kidney, although we realized that this did not at all rule out

tuberculosis of the kidney, and many other facts pointed strongly toward it. On the other hand, when tuberculosis of the kidney has existed for a long time, amyloid changes can take place in the kidney just as they do in other organs, and then amyloid casts will be found in the urine, as was noted in this case.

Probably *the third most frequent type of onset* observed clinically is the sudden appearance, without any apparent cause, of a severe hematuria. Braasch has recently stated that this occurred in about 25 per cent. of his cases. In general, however, this mode of onset probably does not occur in quite so high a percentage of cases. In every case of sudden hematuria of unknown etiology it is important to rule out tuberculosis of the kidney.

Fourth, as a very rare occurrence, it may be pointed out in striking contrast to the above three types of onset, that the disease may run an entirely symptomless course, and it has been repeatedly observed that a cavernous, caseous tuberculosis has been diagnosed in a patient in whom no kidney pathology has been suspected. Albuminuria is often the very earliest symptom of tuberculosis of the kidney, and may exist for months before any other manifestations are evident. Every case of albuminuria of unclear etiology must be regarded as a possible tuberculosis of the kidney until this has been definitely disproved.

A *fifth type of onset* is one in which the first symptoms of the disease of the kidney are those of a perinephritic abscess. The case may have run a symptomless course until this complication occurred. This is a particularly common complication in children. At times in children as well as in adults the symptoms of a perinephritic abscess are the first symptoms of the presence of a tuberculosis of the kidney. In the case under consideration, as you will remember, the patient had no subjective symptoms except the loss in weight, appetite, and strength when he first consulted a physician, and only later did the vague abdominal symptoms develop which are explained by the development of the perinephritic abscess. This had as its main symptoms the vague abdominal discomfort and the tenseness of the abdominal wall, together with meteorism, constipation, and an in-

creased leukocyte count. So that in this patient we had a combination of type four onset associated later with a type five onset. It may be well to point out at this time that various combinations of types often occur.

A *sixth type of onset* consists of an onset with chills, fever, and sweats in addition to any of the above types, and this occurs when we are dealing with a case of mixed infection.

Finally, as regards the prognosis in this case it is difficult at this time to make any definite statement, as it is impossible to be certain whether or not there are tuberculous foci elsewhere. An examination of the urine at this time, except by ureteral catheterization, is of no particular value in determining whether or not the other kidney is involved. The remaining kidney shows some pathologic changes, but is doing its work satisfactorily, and, as you well know, changes in the remaining kidney if not too advanced are often greatly improved or disappear entirely after the more diseased kidney has been removed. It was perfectly obvious from an examination of our second roentgenogram, and even before the diseased kidney was exposed, that it was practically an entirely useless kidney, and that, due to the high grade of stricture of the ureter, no urine coming away through the ureteral catheter, that for all practical purposes the disease in the kidney had accomplished a spontaneous exclusion of the organ, so that one could remove it without the slightest fear that the remaining kidney would be insufficient. The right kidney had been worse than useless.

Following the nephrectomy most of the patient's abdominal complaints disappeared entirely or were greatly alleviated. He is no longer troubled with meteorism, which had distressed him the entire time he was under observation previous to removal of the kidney. Furthermore, the general tenseness of the abdominal wall has completely disappeared. While the patient has improved since the kidney was removed, he is still weak, is still emaciated, in spite of the fact that he eats heartily, still runs an irregular low fever, and does not appear to be improving as rapidly as one would expect if he were suffering from tuberculosis of the kidney alone.

CLINIC OF DRS. ARTHUR DEAN BEVAN AND L. C. GATEWOOD

PRESBYTERIAN HOSPITAL

MESENTERIC FIBROMA

Summary: Patient giving history of having had an abdominal tumor for sixteen years. Repeated exploratory operations fail to reveal true nature of tumor. Examination by Dr. L. C. Gatewood—fluoroscopic findings—diagnosis. Operative treatment. Frequency of mesenteric tumors—solid tumors of mesentery for the most part benign. Points to be borne in mind in the removal of these tumors. After-history of present case.

THIS patient whom I am presenting to you this morning has a long and very interesting history. Sixteen years ago he came to this clinic when it was in charge of Professor Nicholas Senn and I was Associate Professor of Surgery. He came with a large abdominal tumor of uncertain pathology. Senn studied the case for some time and came to the conclusion that an exploratory would be necessary in order to make the diagnosis certain. He made a large midline incision extending from the umbilicus to the symphysis, and exposed the tumor, which proved to be partly solid and partly cystic. At the time of the operation Senn found that he could definitely outline the spleen, which was quite normal, and he could feel the right kidney, which was also normal. He came to the conclusion that the large tumor was a tumor of the left kidney. The patient was not doing very well under the anesthetic and he closed the exploratory wound except at the upper angle, where he sutured what he believed to be the capsule of the kidney into the wound and tamponed it with iodoform gauze, evidently with the intention of later removing what he believed was a kidney tumor. About that time, however, he went on a vacation and turned the case over to me, with instruction to do a nephrectomy and remove what he

thought he had proved definitely to be a tumor arising from the left kidney. I followed out his instructions and made an oblique kidney incision on the left side. Very much to my surprise I came down upon a perfectly normal left kidney. I found that this tumor was in front of the kidney and in the midline. The tumor was so extensive and of such uncertain character that I made up my mind to leave it alone and turn the patient back to Senn's care on his return. Before Senn returned, however, the patient had left the hospital. He came back later with a suppurating area in the midline incision which Senn had made. This was probably three months after my exploratory operation. He was placed on my service. He was very ill, and I contented myself with opening up the abscess in the abdominal incision and draining it.

The patient recovered and left the hospital, and I heard nothing from him until he was again referred to my service a few days ago by Dr. L. C. Gatewood, who had studied the case with a great deal of care. Dr. Gatewood, from the evidence which he could obtain from the old histories and from a careful analysis of the facts, has come to the conclusion that we have to deal with a mesenteric cyst, and I am undertaking the operation with that diagnosis. I will ask Dr. Gatewood to give you the details of the case as he has worked them out.

DR. L. C. GATEWOOD: This patient presented himself about ten days ago complaining of pain and tenderness in the left lower quadrant of the abdomen. This pain began about three months ago and was associated with a sensation of fulness and pressure. Remembering his previous trouble, he palpated his abdomen and found a large rounded mass occupying a large part of the abdomen. He does not believe that it has changed in size since he first observed it. The pain of which he complains has been intermittent. It has been moderately severe for two or three days at a time and would then disappear almost completely for a few days. The sensation of fulness and pressure has been constant and has gradually become more distressing. It is not influenced by food taking nor by the amount or kind of food eaten. The patient has been moderately constipated and

the distress has been associated with a sensation of desire for bowel movement, but has not been relieved by bowel movement, and he has taken frequent cathartics without relief. He has been having three or four small soft or liquid stools per day.

Inquiring into the previous history of the patient I learned of the operations of which Dr. Bevan has told you. The man states that he had no symptoms from the time he left the hospital in 1904 until early in 1909, when he again noticed a feeling of fulness and pressure and again found a mass in the abdomen. He entered a hospital at that time and an opening was made through the old scar into this mass, some fluid was withdrawn, and for many months the cavity was irrigated with an iodine solution until the wound finally closed. He had no further symptoms and had no knowledge of a mass in his abdomen until the onset of pain three months ago.

In the physical examination there is nothing worthy of mention outside the abdomen. There is an old irregular scar in the midline of the abdomen from the pubes to a point 1 inch above the umbilicus. The abdomen is almost filled by a large, moderately firm, rounded mass about the size of a man's head. It measures approximately 9 inches transversely and slightly less in its vertical diameter. The anterior surface of this mass is more irregular than the upper and lateral aspects and the old wide abdominal scar is firmly adherent to it. There is marked tenderness along the left lower aspect of this mass. Rectal examination is negative.

Laboratory findings at the time of original examination were: hemoglobin, 80 per cent.; leukocytes, 15,600; temperature 99.2° F.; pulse 100; respiration 18; urine negative. Ewald test meals showed normal secretion and no blood. Feces contained no blood or pus. After two days the temperature was normal and the leukocyte count was 7900. The pain and tenderness in the left lower quadrant had practically disappeared. While under observation the patient had one other attack of pain in the left side with slight temperature (99.6° to 99.8° F.) lasting two days. No visible peristaltic waves or other signs of obstruction were noted at any time.

Upon fluoroscopic examination of the colon the barium clysma entered readily and the colon filled out to normal diameter, with no evidence of obstruction or filling defect, and the patient experienced very little discomfort. The colon lies lateral to and above the mass and does not pass in front of it or behind it at any point. The transverse colon is at the level of the costal border and the ascending colon is bent sharply upon itself at a point a little above the level of the crest of the ileum, so that the cecum extends upward and inward to a point near the hepatic flexure. Those parts of the colon not under the costal margins were freely movable and not adherent to the tumor.

Fluoroscopic examination of the stomach made the following day showed the stomach in a high transverse position with the antrum behind the transverse colon which could be outlined readily on account of the barium it still contained. The stomach emptied very rapidly, the barium in the small intestine being seen above and to the left of the mass. Observations repeated at frequent intervals failed to reveal any of the barium passing across the area occupied by the mass. Plates made after a considerable amount of barium had passed into the small intestine show the cecum turned sharply upward with the ileum emptying into it at a point near the transverse colon (Fig. 304, A). All of the small intestine is pushed upward to the left or to the right. Both in fluoroscopic examination and in plates the area occupied by the mass shows a shadow of moderate uniform density rather less than might be expected with a solid tumor of such size.

To sum up our evidence, we know that a large ovoid mass is present in the abdomen, that at a time when the same mass or a similar mass was found on exploratory operation it did not involve the spleen nor either kidney, and that its course has been benign. We know that it does not communicate with any part of the gastro-intestinal tract in such a way that barium can enter it, and that it has not encroached upon the lumen of the bowel. The way in which the small intestine is pushed into the upper portion of the abdomen and the flexion of the ascending colon and cecum speak for an origin of the mass in the lower

part of the abdomen and an attachment to the small intestine not far from the ileocecal junction. The position of the cecum is best explained on the basis of traction upward upon the ileum as the mass enlarged. With a mass originating more nearly centrally and not so attached we might expect to find the bowel pushed upward and outward, but would hardly expect to find the colon flexed upward upon itself. The findings upon physical examination and the roentgenologic evidence suggest that this is a fluid-containing mass, and we know that on two previous occasions fluid has been withdrawn from it. In the female there

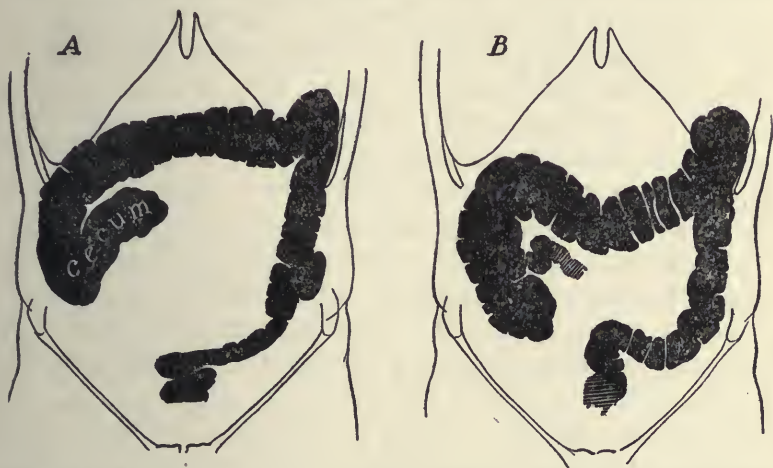


Fig. 304.—*A*, Diagram from x-ray before operation, showing marked dislocation of cecum. *B*, Cecum in normal position after removal of tumor.

are several conditions which might produce or approximate these findings, but there are few benign abdominal tumors occurring in the male which reach such size or which are at all likely to occur in such relation to the other abdominal viscera. Most important of these are the various types of retroperitoneal and mesenteric tumors and mesenteric cysts. I believe that a fluid-containing mass of such size and with such findings as I have described is best explained as a mesenteric cyst.

I quite agree with Dr. Gatewood that a mesenteric cyst is the probable explanation of the clinical picture which we find in this case.

The patient has been prepared for an exploratory abdominal operation and is now thoroughly etherized. You will see on inspection that the abdomen is filled with a very large tumor, as large almost as a pregnant uterus at term, and in about the same location; it pushes the intestinal contents well out of the pelvis and high in the abdomen and in both flanks. I make a very large incision, beginning about 2 inches above the umbilicus and extending down to the symphysis. On opening the peritoneal cavity for the entire length of this incision and holding the edges of the wound apart with retractors, you will see that a very large tumor comes into view. On palpation this seems like a multilocular cyst with very thick walls and looks very much like an intraligamentous cyst. It is bound down and fixed as an intraligamentous cyst usually is. You will remember that we have definite evidence from our previous knowledge of the case that the man has a right kidney, a left kidney, and a spleen all independent and entirely separated from this tumor. You will remember, too, that the tumor has existed for at least sixteen years to our knowledge, that in 1904 it was a large tumor, and evidently has not grown very much since that time, and from the clinical history it is evidently therefore a benign neoplasm.

It seems to me that the way to handle this is like we would handle an intraligamentous cyst, to divide the peritoneum that covers it and holds it fixed in position. In doing this I am able to determine pretty definitely that this huge tumor springs from between two layers of the mesentery, and I am able to find an avascular area between some of the large blood-vessels where I can divide this mesentery and begin to enucleate the growth. I am able to divide the mesentery which covers it to the extent of about 7 or 8 inches, and with my gloved hand I strip the mesentery off from the tumor, first the anterior surface, then passing it behind and below the line of cleavage which enables me to free the posterior surface of the tumor. Finally I reach the upper pole of the tumor, and I am now able to dislodge it and bring it out through the abdominal wall. In doing this, at one point the ileum is so firmly fixed to the tumor that it is neces-

sary for me to dissect it away with a knife and forceps, and in doing this I open into the ileum at one point. I immediately close this with three rows of Lembert sutures. The attachments of the tumor are now entirely free. It has no definite pedicle. I lift it out of its bed and out of the abdominal cavity and pack the huge space from which it was removed with large, dry abdominal pads, which control the venous oozing, which is considerable. I have the assistant make firm pressure over these pads so as to control the bleeding. This pressure is maintained for several minutes. On letting it up I find that the oozing is not from any large vessels, but from the very large surface on each side of the tumor mass, as large as the palm of my hand. Taking some very fine catgut on a non-cutting needle I sew up the oozing surface with fine catgut, first on one side and then on the other. I find, fortunately, that this controls the hemorrhage almost completely. The appendix was very firmly attached to the tumor and was dissected free from it and lies now without any attachment to its mesenteriolum. I think it would be safer and best to remove it. I do this in the usual way by cutting off and invaginating the stump.

In spite of the suturing of the raw surface I find there is still some slight oozing when I remove my pads. I think, on the whole, it would be safer to pack in two pieces of iodoform gauze on to this raw surface and allow them to remain for forty-eight hours. I intend also to put in a couple of cigarette drains. Packing in the two pieces of iodoform gauze about 3 inches wide and about 2 feet long and introducing the two cigarette drains, I now close the abdominal incision. On account of the great length of the incision, in addition to the usual closure I shall use a couple of our favorite button sutures as a means of additional protection. The wound is now closed. My head nurse has already informed me that the pads and sponges are all accounted for. The patient is in very good general condition.

Let us now examine this large tumor. It feels like an enormous fibroma, and yet, on palpation, it feels cystic. Cutting it open I find that it is probably a fibroma with very thick walls, the center of which has undergone cystic degeneration, so that

we find a number of large cavities as big as my fist or half as big as my fist full of fluid (Fig. 305). From the gross appearance I should say, therefore, that it is probably a fibroma that has undergone a degenerative process resulting in the formation of these cysts in the central portion of the tumor. We shall not, however, be able to make an absolute diagnosis until we make a microscopic examination of the specimen.



Fig. 305.—Appearance of tumor after removal.

I want to take this opportunity of saying a word or two in regard to these large mesenteric tumors. We have had three or four of them on our service. They are not common. In a recent article from Finsterer's clinic one of Finsterer's assistants analyzed very carefully the literature and found some 60 cases of solid mesenteric tumors reported. The majority of these were fibromata; some were lipomas; some were fibrosarcomas; a few had undergone myxomatous degeneration; and a few were outspoken sarcomas. In analyzing the literature, these huge ab-

dominal tumors were found to spring from three different anatomic regions, and it was very often difficult to differentiate between these three classes. One is a true mesenteric tumor developing between the layers of the mesentery; second, a retroperitoneal tumor that looks very much as though it were a mesenteric tumor because it separates the layers of the mesentery, and yet it may have developed not from the mesentery but from some retroperitoneal connective tissue, and third, a tumor beginning not in the mesentery but from the intestine, and developing until it assumes the appearance of a mesenteric tumor. I think it is well to realize that these solid tumors of the mesentery are, for the most part, benign. I think that that knowledge is most important, because a few years ago in operating upon one of these cases, a young man of about thirty with an enormous abdominal tumor, I found that the ileum and cecum were closely attached to the tumor, and believing that the tumor was probably malignant I did an extensive resection of the ileum, cecum, and ascending colon. This stage of the operation prolonged the operation very much, and was, I believe, the cause of the fatal termination which unfortunately followed. When we examined the specimen we found that it was a pure fibroma, and I believe that if I had known it was a fibroma or thought it was probably a benign tumor I could have by very careful dissection removed the tumor without resecting the intestine. As I look back on the case I am quite sure that the controlling reason for my resecting the intestine was the fear or belief that I had a malignant tumor to deal with, and that I would not be giving the patient the best prospects of a permanent cure unless I resected the intestine.

Another point I want to call your attention to is the importance of realizing the anatomic location of the tumor and the importance of having an avascular area in the mesentery and, as I told you while we were operating, following essentially the same technic that we adopt in removing intraligamentous cysts, dividing the overlying peritoneum that fixes it in position to an extent sufficient to enable us to enucleate the tumor.

A third point which I think important is that of injuring as

little as possible the blood-supply of the intestine in the enucleation of the tumor.

A fourth point is the importance of controlling all bleeding and the necessity of drainage on account of the dead space that is left. We have all reached the point where we use drainage after abdominal operations as little as possible, and yet in cases of this kind drainage, although it has disadvantages, is, to my mind, very essential and very desirable.

After-history.—The patient made a very excellent recovery, complicated for the first forty-eight hours with a tendency to dilatation of the stomach, which was overcome fortunately by lavage and washing out of the stomach. That with stimulating enemata secured early peristalsis. At the end of forty-eight hours the abdomen was no longer distended and he was then able to take fluids. At the end of the third day we began to very gently remove the iodoform strips. The cigarette drains were removed on the fourth day. The iodoform strips were out entirely on the fifth and the patient went on to a complete and very satisfactory recovery. The microscopic sections showed the tumor to be a fibroma.

Five weeks after operation the patient reports that he is back at his usual work and entirely free from all of his former distress. His bowels are moving normally without laxatives. Fluoroscopic examination at this time shows the stomach, small intestine, and colon in normal position. The small intestine has descended to the site formerly occupied by the tumor and the transverse colon is just above the level of the umbilicus (see Fig. 304, B).

CLINIC OF DR. ARTHUR DEAN BEVAN

PRESBYTERIAN HOSPITAL

DISLOCATION OF PATELLÆ

Summary: Recurrent dislocation of patellæ present for many years. Various operations devised for the relief of this condition. Technic in present case—postoperative dressing.

THE patient upon whom I shall operate this morning is this young woman, twenty-six years of age, who comes to my service with the statement that she has a dislocation in both knee caps, that this condition has existed for ten or twelve years, and that when she was a child she had no trouble of this kind, but that it came on when she was twelve or fourteen years of age. It came on without a history of injury. She gives this description of the trouble: She may be walking along, turn her foot slightly or twist the limb slightly, will have a sudden, severe pain in the knee, and fall to the ground. She feels something slip in the knee, and on pulling up her dress she finds that the knee cap has been dislocated to the outer side. This incident is associated with a great deal of pain. She takes the patella in her hands and pushes it back into place. This also is somewhat painful. She can then get up and go about, but the joint is painful for some days, and sometimes it becomes swollen, evidently a certain amount of traumatic synovitis resulting from the trauma. The right knee cap becomes displaced more readily than the left. She has not had a dislocation in the left knee for a year, but she has had three or four dislocations in the right knee during that time. As long as she wears firm bandages on the knees, which she does, the displacement is not as apt to occur, but it does occur in spite of the bandages. The trouble keeps her on constant nervous tension. Whenever she is walking or moving about

she is fearful of a recurrence of the displacement. She has consulted a number of physicians, and finally has been referred to my clinic.

I have had some very excellent *x*-ray pictures taken, and these show in the right knee a thickened and irregular mass of bone on the under surface of the patella, and also what seems to be isolated masses of bone in the posterior portion of the knee-joint just above and behind the tibia. The left knee, the better knee, shows quite a normal patella and a single isolated mass of bone in the posterior portion of the joint. I have inquired very carefully as to whether she has had symptoms that might be produced by a loose body in the joint, but accurate questioning fails to elicit any such symptoms.

Dr. John B. Murphy in the *Murphy Clinics* (Vol. III, No. 4, p. 839) gave a very good description of this condition and the technic of the operation which he did in similar cases, and again in another clinic (Vol. V, No. 1, p. 135) he described another operation for outward dislocation of the patella in a case in which he found, in addition to the dislocation, a loose body in the knee-joint.

After seeing this patient and looking over the literature of the subject with a good deal of interest and care I find that there has been a lot of work done and a great number of different operations devised for curing this condition. Some of these operations are very radical. In cases of outward dislocation in patients with marked knock-knee, correction of the knock-knee is sometimes the best method of curing the condition. Another operation that has been done with success has been that of chiseling off the insertion of the ligamentum patellæ into the tibia and attaching it to the inner surface of the tibia instead of to the tubercle. This change in direction of the insertion of the quadriceps extensor often cures the condition.¹ Another operation that has been described is that of dividing the femur an inch or two above the knee-joint, rotating the lower fragment inward so that the smooth outer surface of the femur on which the patella

¹ Parker, Charles A.: *Congenital Dislocation of the Patella*, *Surgical Clinics of Chicago*, Vol. 4, No. 2, April, 1920, p. 359.

rests is raised up on the outer side so as to prevent displacement. Other operations have been those of building up a ridge of bone on the femur external to the patella. This has been accomplished by some men by driving some heavy pegs in that position. Lorenz, of Vienna, in particular, published about the time of the beginning of the war—I think in 1914—reviews of the subject, and comes to the conclusion that extensive bone operations are not warranted. He advocates a simpler method and one that I shall adopt this morning, that is, shortening of the muscles and ligaments on the inner side of the patella by dividing them and imbricating them so as to keep the patella well to the inner side and prevent in this way displacement. Lorenz believes that this will usually produce a cure. In extreme cases, however, where it will not produce a cure he advocates removal of the patella and the filling of the defect with fascia lata.

On analyzing all the evidence in this case I have come to the conclusion to do the more conservative operation advocated by Lorenz. There is little tendency to knock-knee and I do not think any bone operation will be required in her case.

She has been put to sleep under ether. I have asked my assistants to pay extreme attention to the asepsis in this case, and in addition to the usual preparation with tincture of green soap, shaving, alcohol and bichlorid, I have added the precaution of painting the field with two coats of tincture of iodine. I shall attempt to do the operation in such a way as to not allow anything to touch the wound except the sterile instruments and not allow even my own gloved fingers or those of my assistants to come in contact with the tissues.

I want to demonstrate to you how easy it is for me to produce this outward dislocation of the patella when the woman is relaxed under the anesthetic. With very little effort I now slide the patella outward and produce this outward dislocation and you see it remains in that position (Fig. 306, 1). You will see, too, that with very little effort I push it back into position. I do not believe that I have traumatized the joint much, if any, in this manipulation. When the patient has the dislocation when she is awake from some slight twist of the limb evidently the

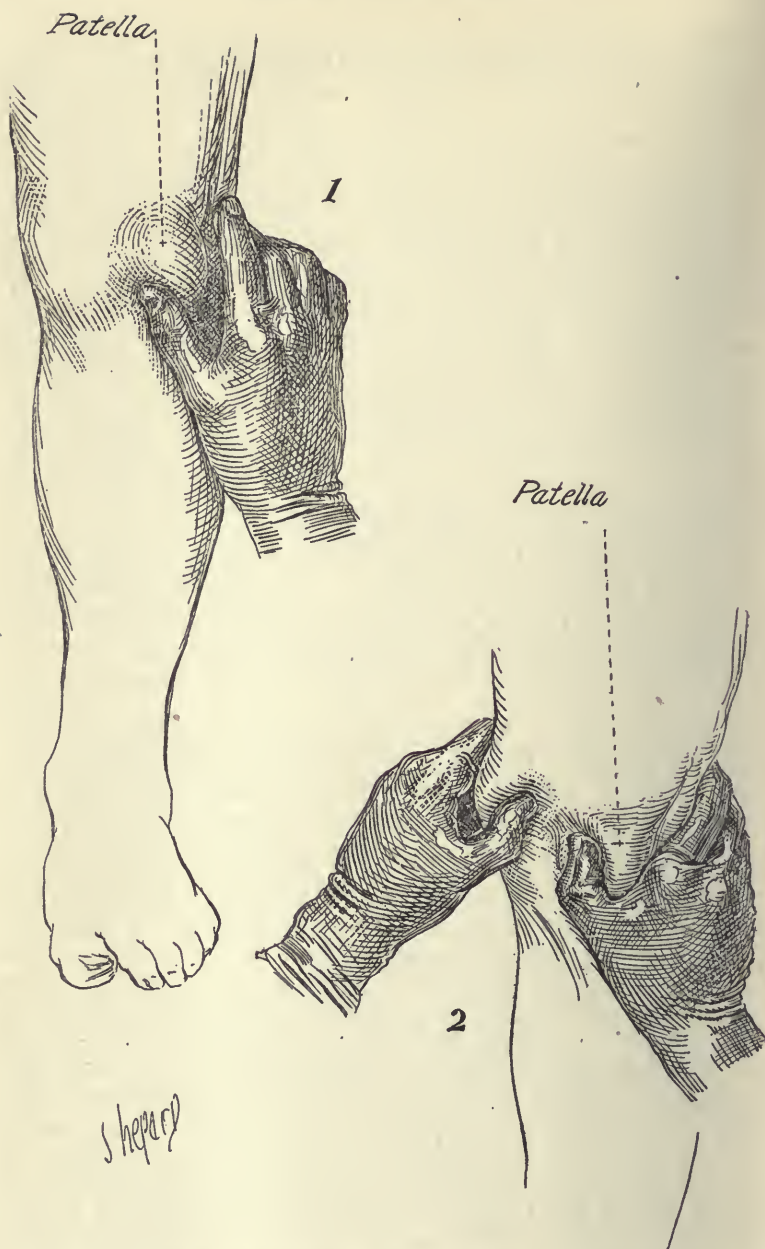


Fig. 306.—1, Patella dislocated with slight pressure. 2, Patella retained in normal position by shortening median musculature.

patella goes out with the muscles tense, and the conditions are such as to make the little accident quite painful, but with the muscles relaxed, as they are under general anesthesia, I am quite confident that we produced little or no trauma by this manipulation. I shall now demonstrate to you the fact that if with my finger and thumb I pick up the tissues on the inner side of the patella and pinch them together, I cannot produce the dislocation. You will see as I hold with my finger and thumb the tissues on the inner side of the patella tightly, I am not able to produce the dislocation.

I now make a vertical incision about $5\frac{1}{2}$ inches in length midway between the patella and the internal condyle (Fig. 307, 1). I divide the skin and superficial fascia and the deep fascia. I now come down to the vastus internus muscle (Fig. 307, 2). I divide the vastus internus muscle for a distance of about 3 inches and I now imbricate the tissues, overlapping them for a distance of about 1 inch, holding them in position with mattress sutures of catgut (Fig. 307, 3). You will notice that I am sliding the outer edge of the incision in the vastus externus under the inner portion of the muscle. In the Lorenz operation he advised opening the synovial membrane of the knee-joint. I cannot see any good to be accomplished by doing this, and shall, therefore, not do it in this particular case. You will notice, however, that I have exposed the synovial membrane for a distance of at least 3 inches. I have made a very careful dissection. You will notice that the fibers of the vastus internus muscle run up at this point fairly transversely outward and slightly downward, so that when we imbricate the muscle for a distance of 1 inch, as we have done, we shorten the tissues on the inner side of the patella very materially. Now that the imbrication is complete, I shall attempt to produce the dislocation. You will notice that I am unable to do this even when I exert a good deal of force (Fig. 306, 2). I am satisfied, therefore, that if we secure good primary wound healing we shall secure an excellent result and obtain such shortening of the tissues at the inner side of the patella as will prevent any recurrence. Having imbricated the vastus internus, I now imbricate the fascia lata which I have

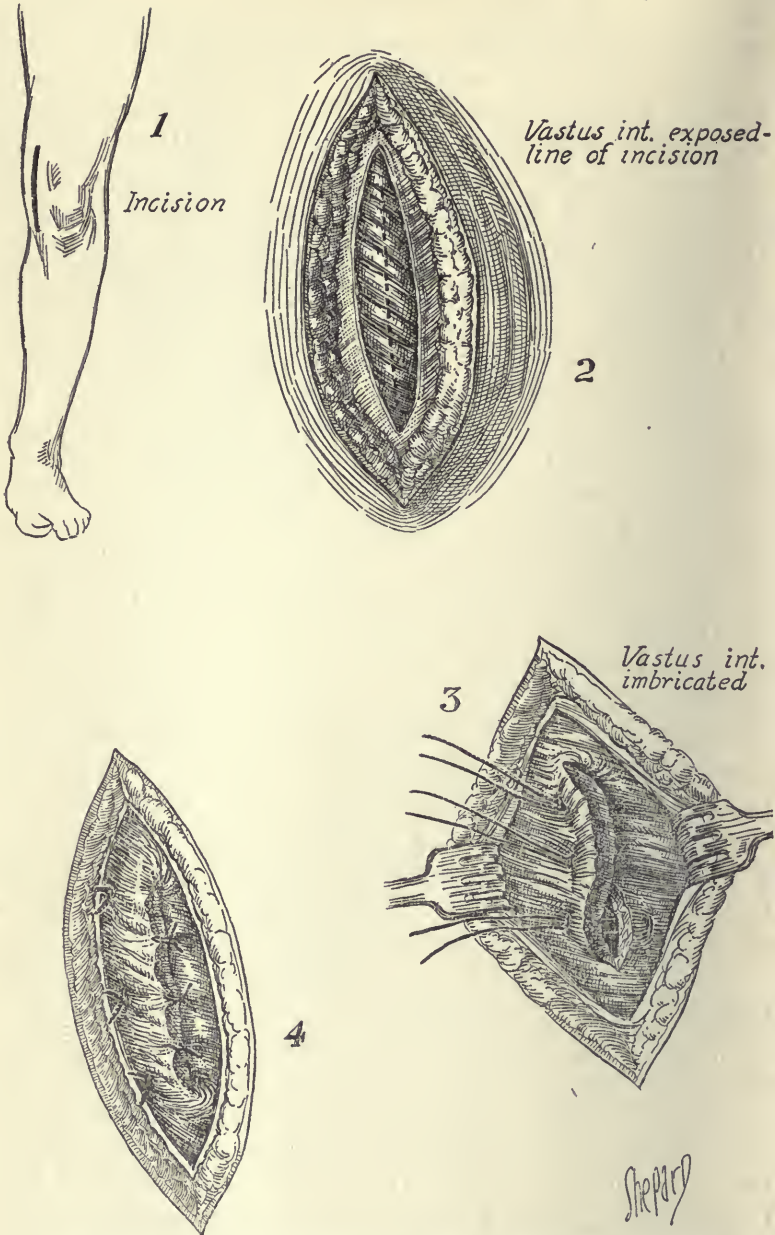


Fig. 307.—Technic of operation for relief of dislocation of patella.

divided, and then close the external incision with black silk (Fig. 307, 4).

I shall now prepare to do the operation on the other side. You will notice I make the same incision and expose in the same way the vastus internus after dividing the skin, superficial and deep fascia. I do not enter the synovial membrane. The x-ray pictures show that this knee is more extensively involved than the other and that there is on the inner surface of this patella an exostosis, probably the result of repeated traumas, and in the posterior portion there are two shadows which are consistent with being isolated pieces of bone, possibly even loose in the joint. My first thought has been to open up this joint and remove these foreign bodies, but I have come to the conclusion not to do this, inasmuch as I can obtain no evidence of any attacks that would seem to point to the patient's having suffered from loose bodies in the joint. I complete the operation on this side in the same way.

I shall dress both of these limbs in copious sterile gauze dressing with a fair degree of tension, a soft-rubber roller over both knees, and put them in plaster of Paris. We will leave the stitches in until the eighth day and leave the casts on until we are sure that we have obtained complete wound healing. I think in order to be on the safe side we will leave the casts on for fifteen to twenty days. After the operation I shall advise the patient to wear knee-caps for several months and be extremely careful not to put the joint through too wide a range of movement for some weeks.

CLINIC OF DR. GOLDER L. McWHORTER

PRESBYTERIAN HOSPITAL

SALPINGITIS WITH LATERAL LUMBOVERTEBRAL PAIN

Summary: Presentation of three cases of salpingitis with lateral lumbo-vertebral pain as the most prominent symptom. Significance of this symptom in certain pelvic cases.

RECENTLY I have seen 3 patients with acute salpingitis in whom the predominating symptoms were in the upper abdomen in the region lateral to the lumbar vertebræ.

This patient, Mrs. G. H., aged thirty-five, was referred to me by Dr. Hardt. She complained of a recent pain in the right side of the abdomen in the region of, or just below, the gall-bladder, of gas in the abdomen, belching, flatus, and metrorrhagia.

The metrorrhagia had been fairly constant following an induced miscarriage three months ago. The bleeding may have stopped for a day or two, but it would always start up with any exertion. The patient had been doing her own work until four days ago. There were no changes at menstrual periods, as she had been bleeding almost continuously. She denied having had anything like this before. Her miscarriage, she stated, occurred only ten days past her regular period. She had no pain at the time.

The present chief complaint—the pain in the right hypochondrium—appeared four nights ago. It developed rather suddenly and soon became so severe that it bent her over when she tried to walk. The whole right side soon became tender and painful. The pain was not so severe the second day and is now noticeable only when she breathes deeply. There is no pain in the chest. She took a large dose of castor oil at the onset. There has been no distention of the abdomen.

Belching and discomfort from gas have been present the last four days.

After careful questioning she gave a history of a slight attack of pain in the left lower quadrant of the abdomen three weeks ago. The attack lasted, off and on, for two days.

Menstruation started at thirteen years and has been regular until the last three months. She was married at eighteen and has had 7 children. She has had two or three previous miscarriages.

On entrance to the hospital physical examination showed a very poorly nourished woman, evidently in a serious condition, although she was able to walk. Her general examination, except for the abdomen and pelvis, was negative. There was no distention of the abdomen. The right side gave moderate resistance to palpation and was quite tender in the right hypochondrium. There was no tenderness over McBurney's point or along the course of the colon. The spleen and kidneys were not palpable. There was practically no tenderness over the lower abdomen, but definite rigidity and muscle spasm could be elicited over the uterine adnexa, perhaps more on the right side.

Examination of the pelvis showed the uterus soft. There was a swelling on the right side the size of a fist. There was marked resistance on the left side, but no definite mass could be outlined.

Blood examination showed 75 per cent. hemoglobin, 11,500 leukocytes, and 3,820,000 erythrocytes. Blood-pressure was 102 systolic and 70 diastolic. The urine was negative except for the presence of a few leukocytes. Her temperature varied from normal during the day to 99.4° and 101° F. at either 4 or 8 p. m.

The pelvic findings and history of metrorrhagia suggested an ectopic or, considering the history of an attempted abortion, infected tubes. The pain in the left side, coming on three weeks ago, was very suggestive of a left-sided infection which had become bilateral.

Under ether anesthesia the abdomen was opened through a suprapubic midline incision. Examination revealed a pelvic peritonitis. There was a bilateral salpingitis and an edematous

parametrium. The left ovary was entirely involved, and apparently this side was the first involved. The right ovary was only slightly involved.

Examination of the upper abdomen revealed negative kidneys and a slightly thickened gall-bladder. The appendix was obliterated. The sigmoid was adherent to the ends of the tubes, and when freed from them, pus ran out of the tubes. I removed both tubes and the left ovary, resecting the partially diseased right ovary. Two cigarette tube drains were placed in the pelvis, one on each side, and the abdomen closed.

The patient had a rather stormy time for the first few days and then made an uneventful recovery. Following the pelvic operation I removed some very severe hemorrhoids under local anesthesia. She has now entirely recovered and is ready to go home.

The second patient, G. E. B., aged twenty-four, complained of pain in the right lumbovertebral region and in the lower abdomen, especially on the left side. The trouble began rather suddenly about ten days ago, with pain in the lower abdomen, cramps, and fever. This lasted two or three days, when she improved, until two or three days ago.

She gave a history of an abortion two years ago at the end of the second or third month. There was some fever and reaction afterward.

On examination, there was tenderness on pressure in the right lumbovertebral region. There was tenderness over the adnexa, especially on the left side. The fever was 103° F. White blood count was 18,000. Urinalysis was negative except for epithelial cells and leukocytes.

Vaginal examination showed a foul discharge. There was a mass on the left side the size of a lemon, with considerable induration of the broad ligament. There was no mass palpable on the right side, but some tenderness was present.

I advised her to go to the hospital, which she did. The next morning, under gas anesthesia, I drained an early abscess on the left side through the vagina. She made an uneventful recovery. Her temperature remained below 99° F. after the

second day. She went home on the fifth day to convalesce. Ten days after the operation she complained of some pain in the left lumbovertebral region, but said she had no fever. Following this she recovered without further complaints.

The third patient, M. G., aged twenty-five, gave a history of an abortion about two weeks ago. A week later she developed pain in the right lower quadrant, which was referred somewhat to the back. She had some pain and soreness over the right lumbovertebral region, but the predominating pain was over the pelvis.

She was kept under observation for several days. Her fever varied from 99.4° to 101° F. during the day. Blood count showed 17,000 leukocytes, which did not increase. Three days after admission the pain in the right side quieted down somewhat, but there was increased rigidity over the left side of the pelvis. At this time there was also some pain and rigidity over the left lumbovertebral region. The fever was higher and there appeared to be definite masses on the sides of the pelvis. Operation proved these to be small bilateral abscesses, which were drained through the vagina.

DISCUSSION

In 2 of these 3 cases there was no difficulty in determining that the trouble was in the pelvis. The first patient had predominating pain in the lumbovertebral region, and a cholecystitis was strongly suspected until she had undergone thorough examination and observation.

In 2 of these cases, at least, undoubtedly the source of the infection was from an abortion; in the third, there was probably a neisserian infection.

Associated with the lumbovertebral pains there were muscle spasm and rather diffuse tenderness.

The urine examinations in these cases were made from the ordinary passed specimens. They were negative except for epithelial and white blood-cells, which are usually present with any discharge from the vagina. There were no persisting symptoms in the lumbovertebral region, and the greatest pain was

always associated with the onset or recurrent attacks of pelvic inflammation.

While a pyelitis would explain the pain in the lumbovertebral region, the examination of the urine and course of the pain would not seem to indicate its presence. It is possible that this lumbo-

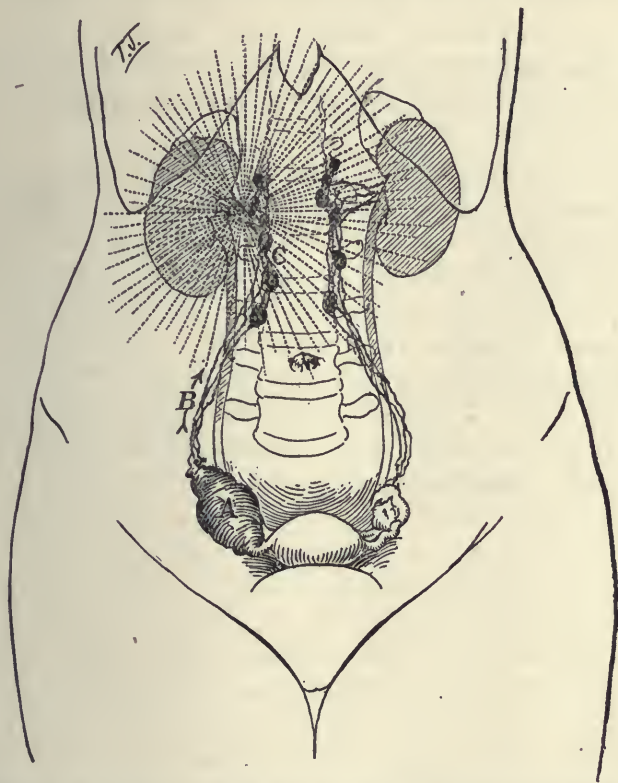


Fig. 308.—*A*, Pyosalpinx. *B*, Path of infection along lymphatics leading to lumbar glands (*C*). Radiating dotted lines represent pain.

vertebral pain is due to inflamed lumbar lymph-nodes. Just why these lymph-nodes are not always tender and give pain is hard to say. Perhaps it is partly due to the type of infection, as the streptococcus, and partly to the amount of parametrium involved. The parametrium was considerably involved in all 3 cases, with very marked edema in the first case.

According to Piersol, the lumbar nodes are twenty to thirty in number and form three irregular rows along the aorta, extending from the level of the second lumbar vertebra to the bifurcation of the aorta and form the plexus lumbalis. The left lateral row is formed by a number of nodes in an almost vertical series upon the heads of the psoas muscle. The right lateral nodes occupy a corresponding position with relation to the right psoas, lying posterior to the inferior vena cava, but a varying number of nodes which may be referred to this group also occur upon the anterior surface of that vessel.

The lateral rows receive afferents from the muscles of the posterior abdominal walls, from the iliac nodes, from the testes in the male, from the ovaries, the fallopian tubes and uterus in the female, and from the kidneys and suprarenal capsules.

This lumbovertebral symptom should receive recognition, as it may be confusing in certain cases where it is difficult to obtain a proper history or where the pelvic symptoms are somewhat in the background. A proper history, careful examination of the pelvis, and a recognition of this symptom of pain lateral to the upper lumbar vertebræ will aid in the correct diagnosis.

CLINIC OF DR. RICHARD J. TIVNEN

MERCY HOSPITAL

CONGENITAL CATARACT BINOCULAR, COMPLICATED BY A LARGE PERSISTENT THYMUS GLAND

Summary: Congenital cataract in a child twenty months old presenting symptoms of cerebral palsy; physical and radiographic examinations reveal presence of a large persistent thymus gland. Cataracts in children—varieties; special discussion of lamellar cataract—tendency to progress—choice of surgical procedure—proper age to operate. Symptoms of thymus disease; treatment; effect of x-ray treatment in present case; radiograms before and after x-ray treatment. Necessity of carefully examining as a routine procedure for presence of enlarged thymus gland in the case of infants and the young upon whom a surgical operation with a general anesthetic is contemplated. Value of the radiogram in the diagnosis of a persistent thymus.

THE ocular difficulty this little patient suffers is variously denominated *perinuclear*, *zonular*, or *lamellar cataract*. This form of lens opacity is the most common type of cataract occurring in children. The illustration (Fig. 309) shows, from frontal and lateral views, the usual location and form of lens opacity. This opacity is located, as a rule, in the layers of the lens between the cortex and nucleus; partial opacities, called "riders," so called because they ride upon, that is, are in contact anteriorly and posteriorly with the equator of the inner opacity, also occur in the overlying layers; the cortex and nucleus, however, are free from opacity. When the pupil is dilated the cataract is seen with the ophthalmoscope to be a dark disk-shaped opacity in the center of the lens, bounded or surrounded at its margins by a transparent red ring of clear lens (Fig. 309). The center of the opaque disk is neither so dark nor so dense as its margins, and the "riders" are seen to radiate, like spokes on a wheel, from the disk margins into the clear lens ring (Fig. 309). Oblique illumination discloses the opacity as a light gray disk

surrounded by a margin of clear lens. From a visual standpoint the density of the opacity is of more importance than its actual extent or diameter. The pupillary area is practically always entirely occupied by the opacity, while the transparent portion of the lens is practically always covered by the iris. In many cases vision is so little impaired that the cataract is not discovered until later years, usually in the early years of

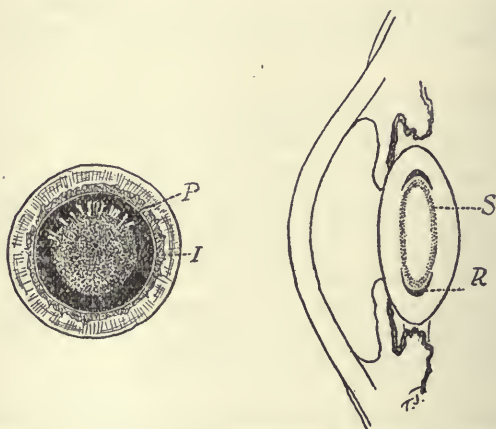


Fig. 309.—Lamellar cataract seen by reflected light. (Magnified 3×2 .) The iris (*I*) has retracted under atropin. The opacity forming the lamellar cataract is denser at the margin than at the center. The riders are depicted in the upper half, but are left out below to show how a lamellar cataract looks with them. Between the margin of the opacity and the margin of the pupil (*P*) is a black interspace corresponding to the transparent periphery of the lens.

Diagram on the right: Lamellar cataract in cross-section. Schematic (magnified 2×1). The layers (*S*) placed between nucleus and cortex are opaque, but the adjacent layer is so only in the equatorial region (*R*), so that riders are formed. (After Fuchs.)

school life. The patients are often presumed to be myopic because they hold small objects close to the eyes in order to obtain a large retinal image. Fuchs believes this practice produces an elongation of the eyeball which results in a real myopia; while Fox holds that the development of lens and globe being interrupted, a small eye and consequent hyperopia result. Both eyes are almost invariably affected and the opacity only rarely increases; occasionally the opacity may develop and involve the

entire lens. According to Spicer, if the nucleus is small, with well-defined borders and the lens periphery perfectly clear, no development of the opacity is to be apprehended. Critchett believes that if small linear opacities radiate from the nucleus edges to the periphery, the opacity probably would progress.

Etiologically, lamellar cataract, as a rule, is congenital; sometimes it develops in early childhood. The patient almost always presents singly or in combination a history of convulsions or tetany, rachitic evidences in the teeth, skull, and long bones, and not uncommonly is below par mentally and physically. Von Arx, quoted by Knapp, found in 189 patients with zonular cataract convulsions in 57 per cent., rachitic changes in the teeth in 66 per cent., deformities of the skull in 32 per cent., changes in the bones of the extremities in 21 per cent. Horner believed that lamellar cataract was the result of rickets; the latter, being a disorder of nutrition, affects not only the bones but also the teeth and lens, which are embryologically similar. His theory was that during the normal process of lens development the rachitis affecting the nutrition interfered with certain layers of lens structure, causing them to become opaque; this cause being corrected, new, transparent lens formed and enclosed the opaque zone. Hesse and Phelps in a study of 43 cases of zonular cataract found distinct symptoms of tetany in 81 per cent., and they believe that zonular cataract is due to tetany.

Syphilis may be a factor in its production, as also heredity and intra-uterine inflammation. Nettleship is of the opinion that when lamellar cataract is hereditary the small size of the lenticular opacity and absence of dental deformity indicate its development during the intra-uterine period. Knapp states that in inherited cataract the mother transmits the tendency to cataract to both sexes equally; according to Groenour, the father transmits the tendency exclusively to one or more sons, sometimes to grandchildren, rarely to a female child.

Horner, in assigning rickets as a cause of perinuclear cataract, emphasizes the changes in the teeth which many of these cases present. Practically all the cases exhibit "strumous

teeth." The characteristic changes (Fig. 310) consist in small horizontal furrows in the enamel around the tooth crown, especially upon the incisors. In the more advanced cases the enamel is absent and the surface is covered with yellow tartar.

Treatment.—The treatment appropriate for perinuclear cataract varies depending upon certain definite factors. Improvement in vision, with the least hazard and distress, immediate and remote, to the eye is the objective desired. In certain cases where vision is satisfactory the ordering of suitable lenses may be all that is required. Usually, however, vision is not satisfactory and some improvement is necessary. Two operative



Fig. 310.—Teeth with hypoplasia of the enamel from a man with lamellar cataract. The teeth are yellow, with rough surface. In most of them two furrows, separated by a protuberance, run around the crown. The protuberance represents an enamel of normal thickness, while in the course of the furrow the enamel is very thin. So, too, the little pits which are to be seen most distinctly on the right upper canine teeth indicate spots where the enamel is thinned. (After Fuchs.)

procedures are available—iridectomy and discission or extraction of the lens. Iridectomy is indicated where there is ample transparent lens available and vision is markedly improved by dilatation of pupil. Where vision is not markedly improved by dilatation of pupil, the proper procedure in young people is discission of the lens; in patients of advanced years, lens extraction. In the vast majority of cases discission is the most satisfactory. This procedure requires a prolonged period for its completion, but is unquestionably the safest measure available, and may be done, as a general rule, on patients up to at least the age of twenty-five. Frequently the lens material, freed by

discission, is with advantage removed through a corneal opening by suction or irrigation, diminishing the tendency to complications arising, chiefly glaucoma, and hastening the reparative process and termination of case. One eye is operated upon at a time and the discission must be repeated at suitable intervals until the lens is absorbed. Proper glasses are then ordered to replace the lens. Considerable diversity of opinion may arise as to the age when operative interference in the young is advisable. When the opacity is relatively extensive and dense no difference of opinion exists as to instituting an early operation. If the opacity be relatively small in extent, occupying but a small portion of the pupillary area, early operative measures may be postponed.

Fuchs believes that "cataracts which are congenital or develop in childhood should be operated on as early as possible, at the age of a few weeks. If the cataract is not operated on the development of the retina is arrested and amblyopia ex anopsia is produced."

My own experience strongly supports this view, and I advocate as early an operation as the child's general physical condition will permit. Early operation removes the optical obstruction which prevents retinal functioning at a period in the child's life when developmental changes are most intense, and avoids the danger of retinal degeneration and consequent permanent impairment, if not, indeed, total loss of visual function. The restoration of visual function which early operation confers is also, I feel quite sure, an important element in the physical and mental progress of the child at a period in its development when even slight disturbances often exercise a deterrent or harmful influence.

The history of our little patient is as follows: He is twenty months old. Dr. George C. Mosher, of Kansas City, the attending obstetrician, has kindly supplied me with the following notes of the baby and the obstetric history:

The mother, a primipara, was first seen about the third month of pregnancy. At that time she was worried about her pulse, which varied from 50 to 60 per minute. Blood-pressure

was 115 systolic and 90 diastolic. There was no history of venereal disease, tuberculosis, or kidney trouble. She had had no miscarriages. Before marriage the husband had a Wassermann reaction, which was negative.

Urinalyses made at frequent intervals during the following six months were negative; blood-pressure varied between 120 and 125. Six days before labor urine showed slight albumin, many white blood-cells, casts frequent, sugar negative; blood-pressure, 150. Two days later, on account of rising blood-pressure and slight general edema, patient was taken to hospital and, under ether, labor induced (von Voorhees bag), lasted almost forty-eight hours and terminated by low forceps; baby delivered with cord once about neck; blue baby; resuscitation of baby required two minutes.

Weight of baby at birth was 6 pounds, 8 ounces; length 50 cm.; its general condition for forty-eight hours following birth normal. Early on the third day the nurse found it in a cyanotic condition, with irregular respiration—Cheyne-Stokes in character—and pulse rapid, but regular. Examination during this attack disclosed both anterior fontanel and the wide median suture bulging, without pulsation; right eyelid edematous, completely closing eye; left eye negative; crying did not increase the bulging fontanel or its hardness; knee-jerks normal; no contractures or spasms present. For three days following baby had almost daily attacks of this character, after which its respiratory and cardiac system gave no further trouble. Both eyes exhibited congenital cataracts. About two weeks later Dr. Curdy, of Kansas City, examined eyes, confirmed the diagnosis of binocular congenital cataracts, and recommended deferring operative procedure until baby was one or more years of age.

I first examined this little patient three months ago. It is exceedingly difficult in infants to conduct a thorough and satisfactory ocular examination owing to the great irritability and lack of co-operation. At this examination I found the lids of each eye were negative; globes normal in size, position, and motility; orbits negative; nystagmus, lateral and rotatory, affecting both eyes, more pronounced when patient was disturbed

or irritated; marked convergent strabismus, apparently alternating fixation; cornea and sclera negative; tension difficult to obtain by palpation, apparently negative; anterior chamber negative; irides negative—no posterior synechiæ present; pupils equal, contracted, and slightly eccentrically displaced to nasal size; pupillary reactions to direct light present, but sluggish; lens of



Fig. 311.—Radiogram of large persistent thymus gland before x-ray treatment. The shadow extends in its horizontal axis approximately $\frac{3}{4}$ inch to the left and $\frac{1}{2}$ inch to the right of the sternal line. Vertically it approximates $2\frac{1}{2}$ inches. (Compare with Fig. 312.)

each eye disclosed a dense, lamellar cataract occupying practically the entire pupillary area; fundus examination impossible; the response to light perception test of each eye in all meridians seemed confirmatory, but it was exceedingly difficult after repeated and patient efforts to be certain of this finding.

The ocular findings indicated with reasonable certainty that visual function might be improved by removal of the cataracts.

I therefore advised discission of lens at once if no contraindications were disclosed by a general physical examination of the patient. Preparatory to the operation I had, as is my routine custom when contemplating any operative procedure in the young either with local or general anesthesia, a radiogram taken of the chest to ascertain the condition of the thymus gland, a Wassermann test made on the blood, and a general physical



Fig. 312.—Radiogram of same case after x-ray treatment. Note that the shadow of the enlarged thymus gland has completely disappeared. (Compare with Fig. 311.)

examination of the patient. The Wassermann reaction was negative. The radiogram was positive, disclosing a very large persistent thymus gland. The roentgenologist's report by John B. Zingrone is as follows:

"The radiogram of the chest shows a well-defined shadow in the area corresponding to that occupied by an enlarged thymus gland (Fig. 311). The shadow extends in its horizontal axis

approximately $\frac{3}{4}$ inch to the left and $\frac{1}{2}$ inch to the right of the sternal line; vertically it approximates $2\frac{1}{2}$ inches. Radiogram diagnosis: Large persistent thymus gland."

In order to decrease the size of the thymus gland *x-ray* treatments were given under my direction at weekly intervals for a period of twelve weeks. A radiogram (Fig. 312), taken after the last treatment, showed that the enlarged thymus gland shadow had completely disappeared. The roentgenotherapy technic employed in this case was as follows:

Broad focus Coolidge tube.

Milliamperes.....	5
Spark gap.....	9 inches
Filter—aluminum.....	2 millimeters
Distance from skin to target.....	12 inches
Duration.....	$2\frac{1}{2}$ minutes
Application.....	1 each week
Number of treatments.....	12

After the *x-ray* treatments were begun I referred the patient to Dr. Robert A. Black, pediatrician, for general physical examination. The following are his notes of the case:

"At Dr. Tivnen's suggestion I have made several examinations of the patient during the course of the *x-ray* treatments. My first examination made a few days after the first *x-ray* treatment presented the following findings:

"*Previous History*.—Baby very blue when born; first twenty-four hours normal, then began to have frequent 'cyanosed spells,' accompanied by rapid, irregular respiration, which continue at irregular intervals to present time. The baby never becomes unconscious during these spells, which last from three to five minutes, and are often only a transitory flush; twelve to fifteen attacks may occur in twenty-four hours; slight noise, undue excitement, hunger or fatigue are the usual inciting factors precipitating attacks. At one year of age patient had a severe pneumonia lasting a month; a month later gastric attack, resembling intestinal influenza, lasting two weeks; history of convulsions or tetany negative.

"*Examination*.—Child well nourished, weight 26 pounds at

twenty months; 35 inches tall; head circumference 16 inches; eight teeth, all normal; hair rather sparse and fine; has many facial grimaces and is in a continual state of activity; noisy toys only ones that interest him; fond of music, has much rhythm; when excited has coarse trembling spells without loss of consciousness; knows all members of family by voice and touch; he has been trained sufficiently to indicate when a bowel movement is wanted, also occasionally the urine; is playful, affectionate, and not particularly rough in playing; seems to understand a great many sentences and on repetition can be made to do little tricks; seems to forget readily—a trick learned is forgotten rather quickly; taste present; has vocabulary of about twenty words and apparently uses them with understanding; is rather spastic on handling, is decidedly ticklish; hands and feet are always sweaty, perspires very easily; no evidences of dietetic tetany; in walking, which has occurred during the past two weeks, drags the right foot a little—right foot is also flat; is right-handed; genitalia small; umbilical hernia present; Babinski reflex negative; all reflexes excessively active—the lower more so than upper; heart, lungs, and abdomen negative; large, well-defined, persistent thymus gland is present, which is easily demonstrable on percussion and corroborated by x-ray findings.

“Marked improvement has followed the x-ray treatment. The thymus has been reduced, and since its reduction the patient has learned to recognize taste, his vocabulary has increased from one word, ‘da-da,’ to about twenty intelligible words; locomotion, which was absent, has been established, the ‘cyanotic spells’ have been reduced, a week having elapsed since the last one, and the trembling spells have been reduced in frequency. Mental status seems to be about such as one would expect in a child of twelve months.

“*Diagnosis.*—Large persistent thymus gland; cerebral palsy due to defective glandular secretion; probability of cerebral hemorrhage at birth.”

I feel quite sure a brief discussion of the thymus gland will be of value in the consideration of this case, especially in its bearing on the surgical aspect and the administration of an

anesthetic, general or local. The following notes on the subject of thymus gland disease are condensed from Dr. Sajous' excellent article on the subject in Sajous' Analytic Cyclopaedia of Practical Medicine, Vol. VIII: The thymus gland is made up of two lobes, situated partly in the superior mediastinum, partly in the neck, in the middle line, and extending from the fourth costal cartilage upward to the lower border of the thyroid. It attains its full size at the end of the second year, when its growth ceases and it gradually diminishes in size, until puberty, when it has practically disappeared. In front it is covered by the sternum, below it rests upon the pericardium, the thoracic fascia separating it from the arch of aorta and great vessels; in the neck it lies on the front and sides of the trachea; it is about 2 inches in length, $1\frac{1}{2}$ inches in breadth in lower portion and about 3 or 4 lines in thickness; at birth it weighs about $\frac{1}{2}$ ounce. The function of the gland is not definitely understood. Sajous believes that "it supplies through the agency of its lymphocytes an excess of phosphorus in organic combination (nucleins), which the body, particularly the osseous, nervous, and genital systems, requires during its development and growth, *i. e.*, during infancy, childhood and adolescence, or later if need be." Enlargement of the thymus gland is commonly spoken of as "status lymphaticus," but Sajous suggests that since practically all the symptoms both in adults and children are due to the enlargement of the gland itself the better term would be "status thymicolymphaticus." The outstanding symptom of enlargement of the gland is *difficult respiration*, chiefly affecting inspiration. This respiratory difficulty has usually three phases—*thymic stridor*, *thymic asthma*, and *thymic death*. Thymic stridor is often congenital or exhibited shortly after birth. It resembles croup, and is aggravated by crying or screaming. It is usually accompanied by a wheezing, which may be relieved by lying on the side or sitting up and leaning forward, and may be precipitated by feeding. Acute infections, especially diphtheria, pertussis, and bronchopneumonia, are often the inciting factor of thymic stridor. Thymic asthma may result progressively from the thymic stridor or occur inde-

pendently. It resembles violent attacks of asthma, with inspiratory stridor, cyanosis, pallor, inspiratory laryngeal stenosis, and sometimes spasm of glottis. Thymic death applies to cases in which death occurs suddenly without previous history of thymic asthma, postmortem disclosing an enlargement of thymus sufficient to compress the trachea, recurrent laryngeal and vagus nerves, the great vessels of the upper thorax and lower cervical region, and the right auricle. It may occur in adults and children after intense emotional excitement, anger, fright, anesthesia, slight operations, extraction of teeth, etc., and during coitus, dancing, swimming, etc. The majority of cases of thymic death occurs in children who are found dead in bed, the cause of death being an enlarged thymus, resulting in asphyxia, tracheal stenosis, laryngeal spasm, or cardiac paralysis. Certain symptoms may, in the majority of instances, indicate a predisposition to the disease. These may involve principally the gland itself, producing *thymic symptoms*, or principally the lymphatics, producing *lymphatic symptoms*.

Thymic Symptoms.—Among the thymic symptoms enlargement of the gland itself is the outstanding one. This enlargement may be demonstrated by *gentle* percussion of the area of dulness. Figure 313 shows this area in a solid black line as an irregular triangle or heart shaped, with its base covering the sternoclavicular articulation and its apex somewhere about the third rib over the base of heart. The broken line indicates the heart outline. The dulness extends on either side of the sternum, more so to the left. If in this location, dulness extends $\frac{1}{2}$ inch or more beyond the sternal line on each side, enlargement of the thymus is probable; if it also extends across the sternum to the right a greatly enlarged thymus is probable. Bulging of the upper part of sternum and enlarged veins over the chest (Fig. 313) may be present. The x-ray may corroborate the areas of dulness, a shadow being present on the left of sternum, sometimes extending downward as far as the ensiform cartilage and over the pericardium. Auscultation may disclose a friction sound caused by the air coming in contact with the edge of the impinged trachea. Other symptoms due to thymic insufficiency,

resulting from the degeneration of the gland into a mass of adipose tissue, may be evident, such as deficient development of the osseous system, bad teeth, etc., suggestive of rickets, mental intolerance, backwardness, a low relative lymphocyte count, sometimes due to the close relationship functionally of the thymus and thyroid insufficiency of the thyroid with symptoms of hypothyroidism, may be presented. Eczema is frequent, as is

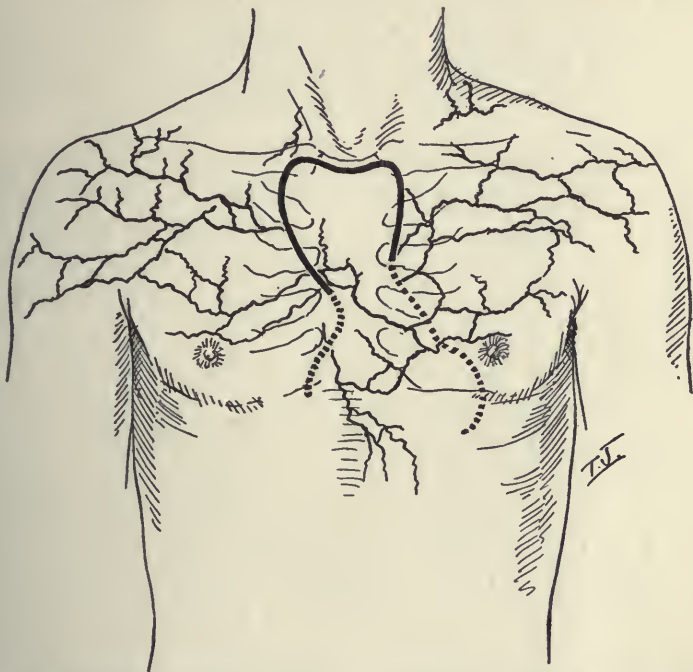


Fig. 313.—Venous engorgement due to enlargement of the thymus. (After Sajous.)

also deficient hair growth and infantile development of the genitalia.

Lymphatic Symptoms.—The superficial lymph-glands, notably those of the neck and axilla, are more or less enlarged. In some cases but two or three lymph-nodes may be hyperplastic, while in others postmortem discloses practically all involved, bronchial, intestinal, mesenteric, and, in particular, the retro-

peritoneal. The tonsils—lingual, faucial, and pharyngeal—are usually enlarged. The spleen is sufficiently enlarged in some cases to become palpable.

The foregoing thymic and lymphatic symptoms constitute the main symptoms of this disease, and when any of these symptoms are found in a child or adolescent who is subject to attacks of dyspnea on exertion or of laryngismus stridulus, the patient is to be regarded as in danger of thymic dyspnea, which may unexpectedly develop a fatal asphyxia. The cause of the stridor and the fatal asphyxia in this disease is variously ascribed as due to pressure of the thymus, to toxemia, and to acid intoxication.

Treatment.—The x-ray is the one effective agent, but it must be used with discrimination. In cases where an enlarged thymus has been rendered deficient through focal degenerative changes, with secondary cretinism, myxedema, or Addison's disease, it will do more harm than good. Where these symptoms are absent and there is a relative lymphocytosis or even leukocytosis the x-ray may prove effective and even curative.

Complete thymectomy is inadvisable in young children owing to the danger of interfering with their development, skeletal, mental, and sexual; after puberty these dangers from the operation are lessened. Partial subcapsular thymectomy, ligation of some of the thymic arteries, exothymopexy (raising of the organ and stitching it to the sternum) are available for children and are usually effective. Deep intubation, the tube reaching below the obstruction, tracheotomy with oxygen inhalations, cold compresses over the thymus, and the upright position are all useful to relieve the attacks of dyspnea. Thyroid gland extract and iodine, the former if myxedematous symptoms are present, the latter when there is a history of syphilis, may prove serviceable. In rachitic cases calcium lactate with thyroid gland in small doses, also thymus gland, is beneficial. *It is to be emphasized that anesthesia and operations readily induce death.*

The prevention of paroxysms in such cases involves the regulation of feeding. Copious feeding tends to thymus enlargement, and such patients should be on a low diet, avoiding any-

thing likely to increase the blood-pressure, such as excitement, crying, etc., cold or hot baths, sea-bathing; selection of favorable position in sleeping, preferably a sitting up or lying on the side; guarding against acute infections, which cause hyperemia of the gland; avoiding constipation and producing a régime of an outdoor life in a mild climate, where catarrhal disorders are not prevalent.

The foregoing is a summary of the outstanding features of thymus gland enlargement. It is probable that persistent thymus gland enlargement of great or less extent is more common than is generally assumed. In many cases it appears likely the enlargement in the course of the child's development may shrink, without disturbance to the patient or, indeed, without its presence being suspected. The important fact, however, to keep in mind is, it seems to me, that aside from the influence the enlargement may otherwise exert, *such patients as surgical risks are undeniably distinct hazards*, and ordinary prudence suggests that the only safe course to pursue when an operative procedure is contemplated, particularly in infants and the young, especially when they present lesions attributable to some vagary of evolutionary character, *is to definitely determine the condition of the thymus gland before the operation is undertaken*. I have personally encountered 3 cases of this character in which a radiogram taken before operation disclosed a large persistent thymus gland. Profiting by these experiences, I have adopted and advocated for some time past as a routine procedure in young subjects the taking of a radiogram of the thymus to determine its condition before undertaking any operative procedure, major or minor, either under local or general anesthesia. In my own experience, physical examination alone of the chest is neither satisfactory nor conclusive, and I have come to regard the radiogram as the most reliable and dependable method when properly taken by an experienced roentgenologist. In one of my cases physical examination of the chest by an experienced and skilful diagnostician proved negative, while the radiogram showed a large persistent thymus gland. Another case, coming under my observation, which strengthened my resolve to

continue my routine practice of always investigating in young subjects the condition of the thymus gland before administering an anesthetic, was that of an infant of two and a half years, upon whom in the course of several months I was expected to perform a tonsillectomy and adenectomy, the parents one morning found the little one dead in its crib. It had suffered no previous illness of any character and was regarded as in excellent health. A postmortem was done and the findings disclosed a large persistent thymus gland with associated general adenopathy. This case was no doubt one of thymic death, as described by Dr. Sajous.

In our little patient this morning the clinical history fits perfectly the diagnosis of a large persistent thymus gland. The attacks of dyspnea, the spells of cyanosis, the delayed development, the mental status, the congenital cataracts—all are characteristic. In addition, the radiogram corroborates the clinical history, and the reduction of the gland, as shown by the skiagraph, under x-ray treatment, is coincident with the improvement in the child's development and diminution in the severity and frequency of the attacks of dyspnea. It is my purpose to defer the discission of the lens in this case until the child attains and maintains the best physical condition possible. When this period is reached I shall have a radiogram taken, and if no evidence of the enlarged thymus be disclosed I shall undertake the discission of the lens.

ENDOTHELIOMA OF ORBIT: TOTAL SYMBLEPHARON; RESTORATION OF CULDESACS; TRANSPLANTED FLAP (WOLFE)

Summary: Total symblepharon with obliteration of the culdesacs following injury to eye in infancy. Restoration of culdesacs by a Wolfe graft, permitting use of artificial eye. Trauma from damaged edges of "shell" eye responsible for development of an endothelioma of the orbit eleven years after operation. Removal of tumor and restoration of culdesacs. Technic of operation.

THIS patient at the age of fourteen months suffered an extensive trauma of right eye from a blow with a walking stick, resulting in loss of the globe, which was enucleated, and severe injury to both lids, terminating in total symblepharon with obliteration of the culdesacs which prevented the wearing of an artificial eye. Twenty-two years later she first consulted me, desiring that an attempt be made to permit the wearing of a suitable prosthesis.

Examination.—This disclosed that the orbital contents were shrunk and contracted and total symblepharon was presented, with complete obliteration of both culdesacs.

At that time I performed the usual operation for restoration of the culdesacs, freeing both lids, excavating a deep furrow for the culdesacs, and lining the new-made cavities with a Wolfe graft from the inner arm, held in position by an appropriately formed piece of block-tin. This operation was successful and the patient was able to wear a prosthesis with satisfaction and comfort for approximately eleven years. About three weeks ago she consulted me again, giving a history of inability to wear the prosthesis for the past six months. Examination of the orbit disclosed that practically the same condition obtained as when she first consulted me eleven years previously. Total symblepharon of both lids was present, the culdesacs were obliterated and the orbital contents, bathed in mucopurulent secretion, were irritated, swollen, and inflamed. In addition, a

well-defined tumor, the size of a large marble, occupied the lower culdesac.

The patient stated that for the past six months she had been wearing a "shell" eye, being unable to obtain another "reform" model, having broken the one which she had worn following the operation. Examination of this shell showed the margins were worn thin, serrated, and nicked, and the patient explained that frequently it had been at times painful to wear, that some bleeding had usually followed its introduction, and that for the past month she had not been able to wear it at all.

Suspecting a possible malignancy, a portion of the growth was excised and sent to the laboratory for microscopic examination. The following is the report on the examination of the specimen made by Professor F. Robert Zeit: "Tumor of orbit. Diagnosis: Endothelioma. Surface epithelioma intact and it shows no atypical growth. Below this a neoplasm; dense fibrous tissue stroma with atypical endothelial cell-nests. An endothelial neoplasm, starting from the endothelial lining of lymph-spaces. These endotheliomata are of slow growth, and although malignant, do not produce metastases for a long time, and are, therefore, often cured by thorough excisions."

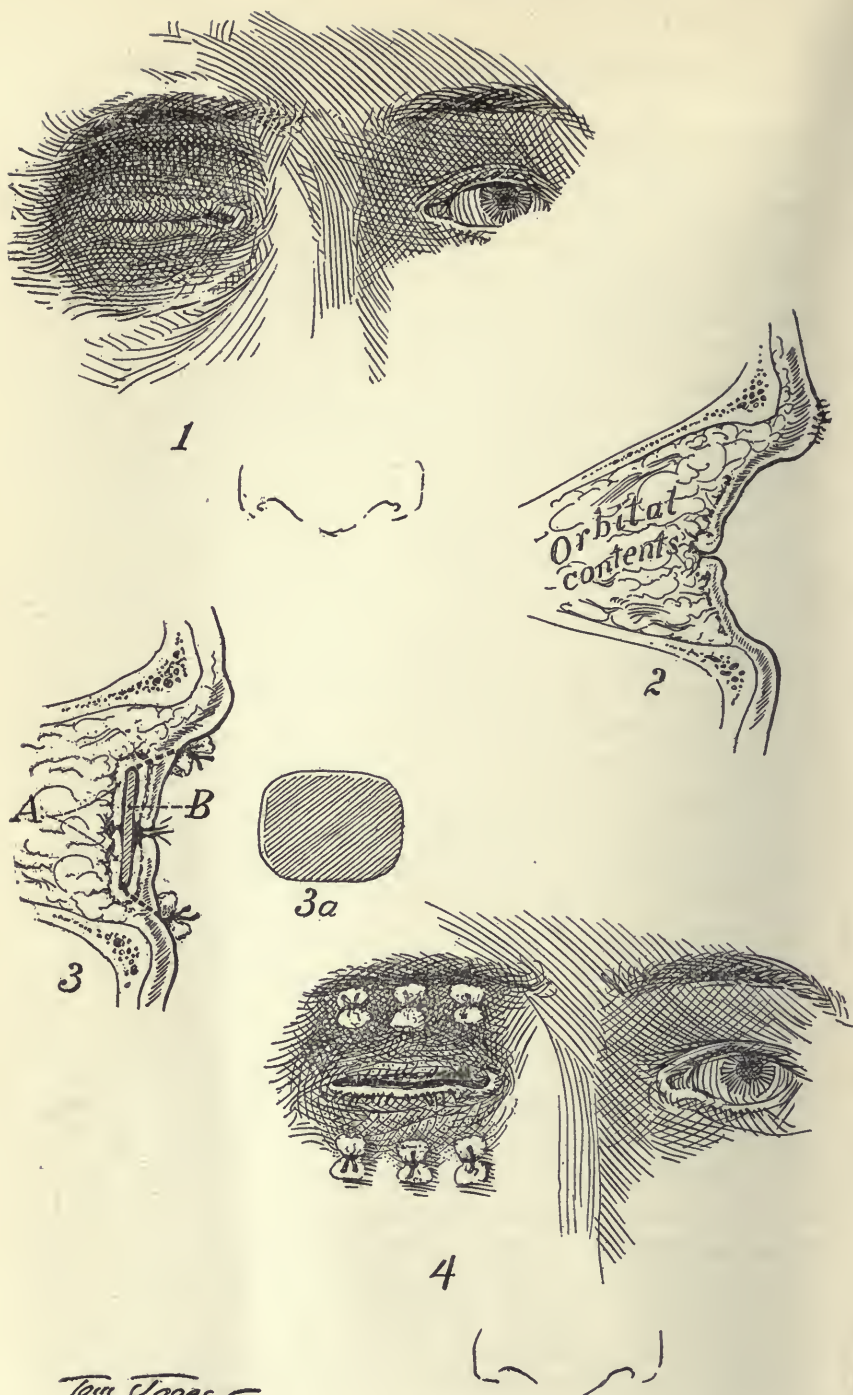
The condition of the orbit this patient now presents, as well as the development of the endothelioma in the lower culdesac, is directly due to the trauma and irritation inflicted by the damaged edges of the "shell" eye she has been attempting to wear for the past six months. Under appropriate treatment the acute inflammatory reaction has subsided and the mucopurulent secretion has practically disappeared. The situation was explained to the patient and she elected to have the tumor removed and the culdesacs restored, so that, if possible, a prosthesis might be worn.

The treatment of total symblepharon, with restoration of the culdesacs, presents many difficulties. In order to obtain a satisfactory result several operations are frequently necessary, and the patience and faith of both operator and patient are often taxed to the utmost before a final successful result is attained. The choice of method, the technic employed, and, in particular,

the after-treatment call for discrimination and judgment as well as painstaking and faithful attention to detail. While similar general surgical principles underlie the successful carrying out of any of the methods employed, a wise choice of procedure applicable to the particular case is of paramount importance, and the happy selection of a method suitable to the individual case goes far in insuring success.

The object in view of all methods may be divided surgically into three steps: (1) To free the lids from the tissues of the orbit; (2) to restore and enlarge the culdesacs, and (3) to line the culdesacs with epithelium to prevent a recurrence of the adhesions. In carrying out these steps I have in several cases employed the following procedure with satisfaction. The first step is usually accomplished without difficulty. In performing the second step it is necessary to provide a generous sulcus to guard against the contraction which invariably follows. This contraction, in my own experience, is always greater at the inner and outer extremities of the culdesac, the canthi, than in the depth of the culdesac. To overcome this tendency to contraction in the depth, and particularly at the outer and inner extremity, I endeavor to extend the depth of the culdesac to the margins of the orbit down to the periosteum, and I employ as large a plate of block-tin as possible, both in vertical and lateral dimensions, incising the external canthus, if necessary, to permit of its easy introduction and comfortable retention, bearing in mind the possibility of pressure necrosis.

The third step, that of lining the new-made culdesacs with epithelium, is the most important as well as the most difficult. In choosing a suitable epithelial lining my own preference is for the Wolfe flap, taken from the inner arm and freed from all subcutaneous tissue. It is remarkable how much shrinking takes place in these transplants. To overcome this shrinkage it is necessary to provide a flap at least three times as large as the actual measurements of the spaces to be covered indicate. To combat this shrinkage Dr. Weeks advocates the fixing of the flap in extension, which he accomplishes by anchoring the flap to the periosteum or its overlying tissue by means of several



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double-armed sutures which pass through the flap, the periosteum, the cheek or brow, and are tied over small rolls of gauze. This method has the additional advantage of fixing the flap firmly to the apex or depth of the culdesac until the attachment is established. I can speak with favor of this suggestion, as I have found it of great service, especially when used in connection with the plate of block-tin. This plate is modeled to fit the enlarged culdesacs, especial care being taken to see that its vertical dimension is sufficient to reach the depth or apex of the sulci, and its horizontal dimension sufficient to prevent shrinkage and displacement of the flap as well as to preserve a sufficient width of culdesac at each canthus.

After removing one flap from the arm all subcutaneous tissue is removed, the retaining silk sutures are introduced in the appropriate position, carried through the periosteum and cheek, and tied over the small gauze rolls. The remaining flap is treated in a similar manner and finally the block-tin plate is inserted. It is essential before applying the flap that all hemorrhage in the culdesacs be checked, and the flaps themselves should be handled with great care to avoid trauma and consequent reduction in their vitality. After concluding the operation the lids are lightly covered with a bichlorid ointment (1 : 5000) and a light dressing applied. The dressings are changed within forty-eight hours and the lids cleansed; the retaining sutures are left in position about ten days.

In operating on this patient one week ago, removing the endothelioma radically and restoring the culdesacs, I employed the foregoing technic, and today there is every evidence that our efforts will prove satisfactory.

Figure 314 illustrates the condition she presented and the steps carried out in the operation.

Fig. 314.—1, Appearance of the injured eye before operation—the inversion and retraction of both lids were marked. 2, Lateral view, showing both lids adherent to the orbital contents. 3, *A*, The epithelial flap in position; retained in position by the plate of block-tin (*B*). The dotted lines represent the retaining silk sutures through flap, periosteum, cheek, and bone. 3*a*, The plate of block-tin. 4, Front view of eye after operation, with the three upper and lower retention sutures tied over small rolls of gauze.

EXTRADURAL ABSCESS: OTITIS MEDIA PURULENTA CHRONICA; OPERATION; RECOVERY

Summary: Patient presenting symptoms of brain abscess, the sequel of otitis media purulenta chronica of eleven years' duration. Neurologic findings by Dr. Mix—significance of wild delirium presented by patient—diagnosis. Types of brain abscess following otitis media. General symptoms of brain and extradural abscess—prognosis; value of early recognition and prompt surgical measures. Operative treatment and result in present case.

THE history of this patient is as follows:

He is sixteen years of age and has always enjoyed good health. At the age of five he developed an otitis media purulenta of the left ear. The origin of the otitis media is not clear; there was perhaps an acute pharyngitis, tonsillitis, rhinitis, or something of that kind; it was not of the diphtheric or influenzal type, and apparently was not streptococcic. The discharge did not clear up, but continued in a subacute form with occasional exacerbations of pain up to the present time. Last Monday he developed a severe pain intermittent in character in the ear and first came under my care. Examination of the ear disclosed the drum membrane practically destroyed and a moderate purulent discharge present. His temperature was 99.2° F.; pulse 93. The mastoid was not tender and the patient's general condition at this time was comfortable, with no pain in the ear, and did not suggest the serious involvement which later developed. I placed him on the usual treatment and directed him to report the following morning. During the night the patient discovered a package of aspirin tablets and took, it was estimated, approximately 120 grains. The following morning he was stuporous and rather irritable. I ordered him to the hospital at once. By afternoon the irritable condition had increased markedly and he became very delirious. No rigors were present. A spinal puncture was done. The recovered spinal fluid was very turbid and disclosed a very high count, 8950 cells per cubic millimeter.

Examination of the spinal fluid and of the purulent discharge from the ear showed the presence of pneumococci in both.

The left eye turned in, due to paralysis of the external rectus muscle. The pupillary direct light reflexes were sluggish. Examination of the eye-grounds was negative. A diagnosis was made of meningitis, with a probable temporosphenoidal lobe abscess secondary to an extension of the middle-ear infection. The serious nature of the case was explained to the father, and at my suggestion Drs. Andrews, Mix, and Kreuscher were called in consultation. These consultants agreed with the diagnosis and joined in my suggestion that an immediate operation be undertaken. I will ask Dr. Mix to give you the neurologic findings and to elaborate on the significance of the symptomatology from a neurologic standpoint.

DR. CHARLES LOUIS MIX: The findings which Dr. Tivnen states this patient presented, namely, that he was stuporous and rather irritable, that the spinal puncture disclosed a turbid fluid with a very high cell count, 8950 cells per cubic millimeter, and almost thick enough to deserve being called purulent, were present on Tuesday morning. At that time he had no signs of meningeal disturbance, but by Tuesday afternoon there had developed a paresis of the left external rectus of the eye, so that the eye turned in. By the time I examined him he had also developed a well-defined Kernig sign on both sides. He also showed a considerable degree of rigidity in his neck and a great deal of rigidity in his back. There was also a marked rigidity of his abdominal muscles. These evidences of rigidity, including the Kernig sign, are indicative of the presence of meningitis, in which disease there is hypertonus of the muscles everywhere.

In addition to the hypertonus there was also marked hyperalgesia; everywhere he was touched he manifested displeasure, and evidently hated to be moved or disturbed in any way. Examination of the secretion from the ear and examination of the cerebrospinal fluid showed the presence of pneumococci in both, which seemed to indicate a rather ominous outcome.

The most important element, however, in his symptomatology I have not yet mentioned. This was an unusually wild delirium.

The patient on Monday night was perfectly rational. During the evening he took a large amount of aspirin, as Dr. Tivnen has already stated. He was all right on the morning of Tuesday, but by afternoon, when I examined him, he was in a state which might almost be called maniacal. He was an extremely hard patient to examine. His hyperalgesia was such that he resented being touched, and on one occasion he grabbed my thumb and bent it backward with all his power, as though he did it consciously and viciously. I am persuaded, however, that he did not know what he was doing. Such a very sudden onset of delirium is usually associated with edema of the cortex. One finds it, for example, in the superficial veins of the piaarachnoid. One finds it in the so-called "wet brain." This excessive delirium, constituting almost a mania, is not a part of the picture of an ordinary case of meningitis. In cerebrospinal fever the onset is usually with headache, vomiting, and fever, followed within a few hours' time by hypertonus and hyperalgesia, these two generic signs indicating the specific irritation of the central nervous system. Delirium occurs usually fairly early and is also a sign of irritation of the membranes of the brain, but no such delirium as was found in this case occurs in the ordinary patient suffering with meningitis. The main fact in this boy's disturbance was the presence of a delirium very sudden in onset and out of proportion to the rest of his symptoms. The fact that he had such a delirium together with the additional fact that he had a slight paralysis of the left external rectus would seem to indicate that his disturbance did not lie in the posterior fossa. One would rather be inclined in the presence of such delirium to suppose that the brain complication, resulting from the discharging ear, lay in the middle rather than in the posterior fossa.

Another question which immediately presented itself was whether the abscess which we assumed must be present, inasmuch as there was so much evidence of cortical edema, was extra- or intradural. The presence of 8950 cells per cubic millimeter might lead one to infer that the abscess had already broken intradurally. On the other hand, since the patient was not in a

stuporous stage, but was in a state of excessive excitement, it was evident that he was still in a state of irritation, and it was likely that the abscess had not broken. Had the abscess broken we should expect the patient to be in a state of stupor. It seemed likely that the abscess started from the ear, that it went through the tegmen tympani, that it had reached the interior of the middle fossa, and that it had produced an extradural abscess compressing the temporosphenoidal lobe. We had to assume the presence also of a meningitis because of the cerebrospinal fluid and the presence of pneumococci in it.

Immediately the question of treatment came up. It was evident that if anything were done it would have to be done immediately. The wisest thing seemed to be to open into the middle fossa close to the petrous portion of the temporal bone with the hope of finding an abscess which could be drained. Operation was, therefore, decided upon by the consultants.

DR. TIVNEN: From an otologic standpoint we may summarize the pathologic evolution of this case as follows: First, our patient in early childhood, at the age of five, contracted an acute otitis media purulenta, in all probability secondary to a pharyngitis or acute rhinitis. Second, this infection cleared up only partially and the patient was left with a chronic otitis media purulenta. Third, as time went on a chronic process developed, an occasional acute exacerbation occurred, the perforation in the drum membrane increased, and the mucous membrane of the tympanum was infected; polypoid degeneration ensued, the purulent discharge persisted, the ossicles were attacked and became necrotic, the hearing function was practically destroyed, and finally, early Tuesday morning the suppurative process broke through the bony roof of the attic and invaded the region of the middle cranial fossa, resulting in an extradural abscess of the temporosphenoidal lobe with involvement of the surrounding meninges. The majority of cases of intracranial extensions secondary to middle-ear infections are due to the chronic type of ear suppurations. When does an acute middle-ear infection become a chronic one?

There is no hard-and-fast period of duration which character-

izes the merging of the acute process into a chronic one. An arbitrary rule exists, however, that when the discharge following an acute otitis media purulenta persists longer than eight weeks the condition is classed as a chronic process. The pathology of the chronic process is, of course, a more extensive and destructive invasion of the ear structures than occurs in the acute process. The explanation of an intracranial extension of a chronic suppurating ear is to be found in the close anatomic relation of the ear and mastoid to the cranial fossæ. Examination of these several structures discloses that only very thin bony partitions separate them and, in addition, the vascular and lymphatic relations are likewise free and intimate. The roof of the tympanum which separates it from the middle cranial fossa is exceedingly thin; so, too, is the roof of the mastoid antrum and that of the mastoid itself. The walls of the mastoid are in close contact with the lateral sinus, the facial nerve, and the labyrinth. The communication between the mastoid and tympanum is direct and most easily accessible and the floor of the tympanum is in close contact with the carotid and jugular bulb. In addition to these close anatomic relations—common to both adults and children—there are in the young additional routes of infection provided by the ununited sutures between the several portions of the developing temporal bone, as well as dehiscences, which occasionally occur. These intimate relations permit the extension of an acute or chronic process to the related structures with comparative ease. As a result of such invasion the following complications may develop: by an extension outward through the mastoid cortex a subperiosteal abscess located behind the auricle may be produced; extension through the tegmen tympani into the middle cranial fossa may cause a cerebral abscess or meningitis; extension backward into the cerebellar space or lateral sinus may produce a cerebellar abscess or lateral sinus thrombosis; extension downward and backward into the digastric fossa, with escape of pus into the tissues of the neck may result in a Bezold's abscess; extension downward through the floor of the tympanum may involve the carotid or jugular bulb; extension inward through the inner wall

may involve the facial nerve and labyrinth; extension into the general system may produce metastatic infections of the lungs, heart, liver, spleen, kidneys, joints, etc.

It would appear from the close anatomic relation of these several structures that extension of the middle-ear infection to the cranial structures would occur commonly and frequently. Clinically, however, perforations of the mastoid cortex are much more frequently encountered than extension of the infection into the cranial cavity or to the lateral sinuses. The cause of the intracranial complication is the entrance of infectious products from the suppurating ear or mastoid focus, usually through a necrotic bone area coming in direct contact with dura or sinus. Occasionally it occurs through a vascular or lymphatic channel.

As to the frequency of intracranial involvement from suppurative middle-ear process, it may be said that such involvement is very uncommon consequent upon *acute* suppurative middle-ear process, occurring in about 25 per cent. of such cases. The majority of such extensions are, as I have said, chargeable to *chronic* middle-ear suppurations. The particular type of intracranial involvement is subject to considerable variation. It may be a general meningitis, an epidural abscess, a sinus thrombosis, or a cerebral or cerebellar abscess. Hassler states that in 81,684 ear cases treated there were 116 deaths due to intracranial extension; of these, 48 died of sinus thrombosis, 28 of cerebral abscess, and 40 of meningitis. Of all intracranial complications consequent upon suppurative middle-ear disease, sinus phlebitis and sinus thrombosis are most frequent. It is generally admitted that a large percentage of brain abscesses are due to suppurative ear disease. Osler states that one-third to one-half of brain abscesses follow otitis media, and that the vast majority of these are consequent upon a chronic type of infection. Temporal lobe abscess is about twice as frequent as cerebellar abscess. This is explained by the anatomic fact that the temporosphenoidal lobe rests upon the roof of the tympanum, only a thin plate of bone intervening. Abscesses of the fronto-occipital lobe are very much less common than those of the temporosphenoidal lobe.

The symptoms in general of brain abscess are those of localizing significance and those arising from the septic process itself. The localizing symptoms are dependent upon the location of the abscess. The symptoms arising from the abscess, irrespective of its location, vary greatly. Macewen divides the process from a symptomatic standpoint into three stages—the first stage being characterized by pain in ear, extending later to temporal, frontal, and occipital regions, vomiting, rigors, slight elevation of temperature, accelerated pulse, prostration marked, and lessened ear discharge; the second stage, by diminished pains, tenderness over and around mastoid to percussion, slow cerebration, mental obscuration, temperature normal or sub-normal, pulse slow and full, optic neuritis frequently present; the third stage by stupor and coma, and, if abscess ruptures, by rigidity of limbs, clonic spasms, quick pulse, rapid respiration, and high temperature.

Epidural abscess, in a broad sense, is, as Dench expresses it, an effort on the part of nature to confine a meningeal infection to a localized area and thus prevent general meningitis. Often no symptoms in this type of abscess are complained of by the patient other than a localized headache, with tenderness on percussion over the painful area, the ear and mastoid being relatively free from pain.

In a given case of middle-ear infection, either of the acute or chronic type, with suspected mastoid involvement, such a localized headache, in connection with slight rise in temperature, is to be considered suggestive of a possible extradural abscess.

The prognosis of brain abscess depends in great part upon the prompt recognition of the complication, the stage in which the surgical relief is instituted, the area and extent of the process, and the success in locating and evacuating the purulent collection. The percentage of recoveries varies, according to the stage operated, from 10 per cent. in the early stage to 90 per cent. in the late stage—the average percentage being approximately 50 per cent. Epidural abscess offers a more favorable prognosis than cerebral or cerebellar abscess.

In view of the fact that all our experience with the intracranial

complications of middle-ear and mastoid infections emphasizes the great value, as a life-conserving factor of *early and prompt operative interference*, it is incumbent upon us to maintain a vigilant attitude in such cases, to the end that the benefit of an early surgical measure may be instituted, when conditions indicate, without hesitation or unnecessary delay. Our present case is a striking example of this. It is certain that early recognition of the intracranial complication from which he suffered, coupled with the prompt institution of the proper surgical procedure, saved his life. A delay of many hours would undoubtedly have entailed most serious consequences.

In conducting our operative procedure we have the choice of two routes of entering the cranial cavity in cases of brain abscess complicating middle-ear suppuration. In such cases it is reasonable to assume, unless localizing data suggests otherwise, that the cerebral involvement is located in and about the area most commonly the site of such an abscess, namely, the temporosphenoidal lobe in the middle cranial fossa. The two routes are through the skull surface and through the mastoid. The latter route is preferable, as it permits the tracing of the pathologic process in the direction it followed in its invasion of the cranial cavity; the necrotic areas are also more easily explored, and the offending primary focus is reached and removed. In this case, therefore, I planned to investigate first the temporosphenoidal lobe, believing it to be the most probable site of the abscess, choosing for the purpose the mastoid route. I prefer for this work an electrically driven burr. Its use lessens the shock and jar to the skull and brain and it permits of rapid and thorough exenteration of the mastoid.

I made the usual mastoid incision, extending it above the squama. The periosteum was reflected over the mastoid and skull areas. The mastoid was first entered in the region of the mastoid antrum and the antrum uncovered. The mastoid cells were exenterated and the lateral sinus exposed to a sufficient extent to determine the condition of its walls. A circular plate of bone, about 1 inch in diameter, was then removed from the squama over and including the temporal lobe and the zygoma.

The roof of the antrum and tegmen tympani was removed. In the region of the middle cranial fossa an abscess was encountered and about 2 drams of pus escaped under marked pressure. The dura was only slightly disturbed, pulsation was present, and there were no fluctuating areas. A nosophen gauze dressing was inserted, the wound filled with gauze, and a sterile dressing applied. His condition was so critical that I felt it unwise to carry out a radical mastoid operation at this time, and I deferred this procedure until a later and more favorable period.

Within thirty-six hours after operation the patient had recovered from the delirium and presented a normal mental condition. His subsequent progress was uneventful, and his improvement continued daily without untoward symptoms or complications arising. In the course of eight weeks he was dismissed from the hospital in excellent condition.

CLINIC OF DR. KELLOGG SPEED

COOK COUNTY HOSPITAL

BURNS

Summary: A study of 496 cases of burns. First-aid treatment and subsequent management. The treatment of shock an important factor. Treatment of burns in children. The ambrine method—technic of application.

ALTHOUGH most corporations around Chicago are now compelled by state law to care for their injured employees, there are still admitted to this hospital many patients suffering from burns. Upon questioning these patients, especially the children, it seemed that many instances of scalds and burns were unnecessary if a little precaution were taken in people's homes. Also a small amount of instruction in the treatment may help save the patient a long period of painful dressing and disability. With the present facilities for lighting by electricity and the use of gas stoves for cooking there should be theoretically a diminution in the number of burns. A large proportion of the hazards from open fires have been eliminated, but there still remain a few houses, especially those whose inmates are admitted to this hospital, where open fires, kerosene or gasoline fuel are employed. Such a serious matter as burns and scalds requires investigation. During the last three years there have been admitted to this hospital over 500 cases of burns. Of these, I have studied 496. Out of the total number, 326 were burns and 170 were scalds, usually from hot liquids, as water or soup, and rarely from hot grease or fat. A review of the histories is a psychologic study. One middle-aged man who had a misunderstanding with his wife had his clothes saturated with oil and ignited by this spouse. He failed to survive. Whether the woman was indicted for manslaughter is not told by the

history. Domestic disputes were frequently settled by burns received by one party or the other. A favorite method was to drench the opposing party with boiling lard or grease, and in one case a father, becoming angry with his seventeen-year-old daughter, burned her by this method so that she died. One woman fifty-five years of age on a certain cold day sat on a hot flat iron to get warm. She remained there until in pain and died one month later as a result. Yet another woman was taking a steam bath over a home-made heater. She became overcome with the heat and was powerless to move. Her husband found her after several hours, but her burns were so extensive that a fatal termination followed.

Many children suffered burns from playing about bonfires. Others received severe scalds from the tipping of kettles of boiling soup or water, and others sustained serious scalds when sent to fetch the boiling coffee pot from the stove. Older children frequently upset hot water on babies, or small children fell into open tubs of hot water. One child was bathed in too hot water by a midwife immediately after birth, death resulting in twelve days.

Among the 496 cases there were but 2 x-ray burns. Alkali burns were 4 in number, acid burns, 8. Gasoline and benzine accounted for 8 burns, while there were 5 electric burns, mostly from handling live wires. One severe burn resulted from a child playing in the dark with rat poison, which was luminous on account of its phosphorus content. Tetanus followed one burn.

In the 496 cases there were 151 deaths, a mortality of 27 per cent. Of the total number of deaths, 70 occurred in children five years of age or younger. A large proportion of the deaths occur within thirty-six hours after injury. These are the result of shock, a most difficult factor to combat. Deaths following after several days or weeks can be attributed to nephritis, exhaustion, infection, and bronchopneumonia. The autopsy findings in 2 average cases were:

Third degree burns of the neck, trunk, face, left shoulder, and hand; beginning bronchopneumonia; marked hypostatic

edema of lungs; marked emaciation and anemia; almost empty bowel; large sacral bed-sores; marked edema and hyperemia of the leptomeninges; foramen magnum pressure furrow of brain stem; cloudy swelling of kidneys; marked passive hyperemia of lining of bowel, rectum, and trachea; petechial hemorrhages into lining of the stomach, duodenum, and rectum; marked fatty liver; marked fatty changes of the kidneys; myocardium, lining of the carotid, and left coronary arteries and aorta; lessened yellow material of the adrenal cortices; slight hyperplasia of the spleen; disappearing scalp bruises; marked coal-dust pigmentation of lungs and visceral pleura; canities; bilateral fibrous pleuritis; abdominal splanchnoptosis, cholecystocholic ligament.

First and second degree burns of trunk, arms, neck, and face; edema of the leptomeninges; superficial bruises of the cerebrum; petechial hemorrhages of the cerebrum; bruises of the deep scalp tissues; edematous bruises of torsi, face, and arms; multiple abrasions of arms, legs, and trunk; singed scalp hair; absent and singed axillary hair; calloused and dirty palms and sores.

Our treatment can be divided into primary and secondary. Primary treatment includes first aid and care during the subsequent acute stage until the wound is healed. In this treatment primary skin-grafting and flap transplantation are sometimes necessary. Secondary treatment includes all operative and orthopedic treatment, looking toward the avoidance of contractures from scars which will interfere with function. It may be necessary to consider these contractures from the very first, and the use of splints and proper position of limb should be employed as soon as they are helpful.

Primary treatment must consider first the shocked condition of the patient. Shock is manifested in all burns of considerable extent and the patient may fail to rally from it—dying long before any other direct result from the burn itself could be expected. To avoid any additional shock after the burn has taken place the patient must be quietly yet quickly handled, wrapped in blankets to preserve body heat, given strong sedatives to relieve pain and stop hysteric motions and thrashing about. Also, to guard against pain, the removal of adherent clothing

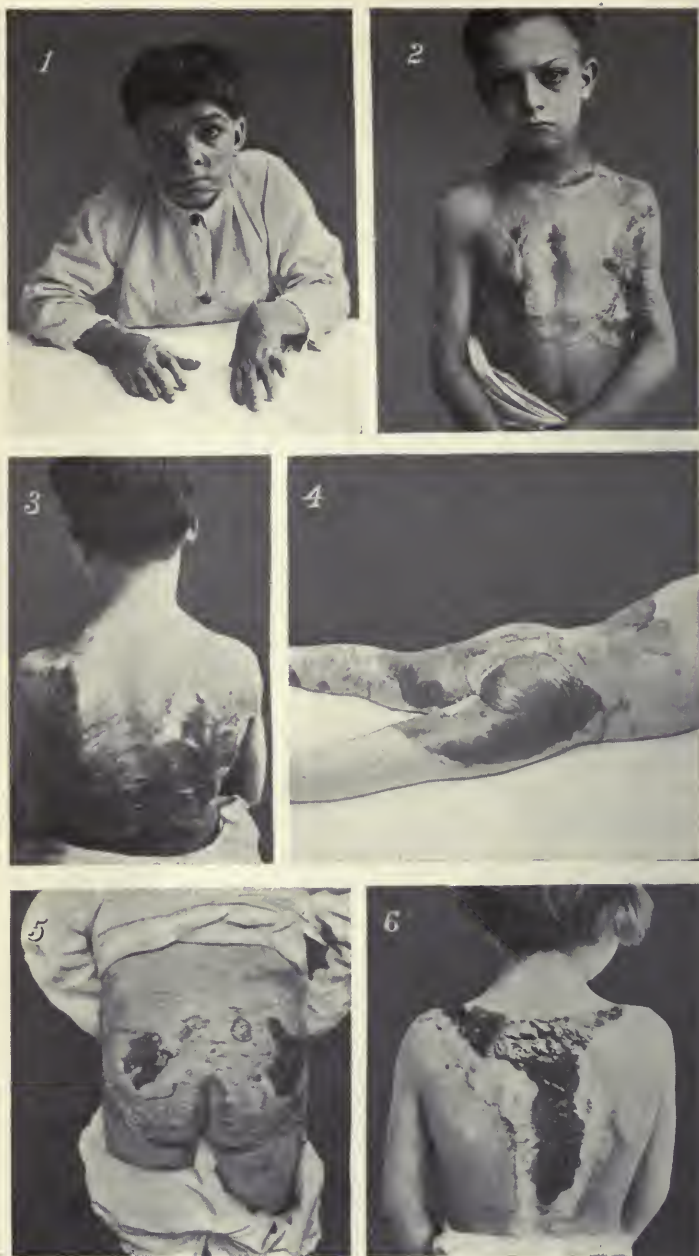


Fig. 315.

must be done only when a proper dressing can be applied, so that as little disturbance as possible is made of the burned area. If the pulse is weak, stimulating enemata of hot coffee are indicated, provided the buttocks are not burned.

Shall we institute a first-aid dressing for these burns? Formerly carron oil was extensively used, the combination of the alkaline lime-water which neutralized the acid products of the burn and stopped pain, aided by the linseed oil covering to exclude the air, was presumed to be almost ideal. It is very difficult to sterilize carron oil and to keep it sterile when not frequently used. Burns are sterile immediately after formation and all subsequent infection is carried on to them from without. To preserve the sterility left by the causative heat, picric acid in 5 per cent. aqueous solution has been much used. In the British Navy it is used as a first dressing for the serious burns incidental to warship management. In civil life it can also be used. It is a strong antiseptic solution. I use it in alcoholic solution instead of iodine to sterilize the skin before operation. It penetrates, leaves a cool, clean skin, and does not tend to vesicate as iodine solution does. Various other first-aid dressings have been employed. A heavy layer of vaselin or liquid petroleum, poured over the burn wound and covered with gauze, and aqueous solutions of 5 to 10 per cent. of sodium bicarbonate, covered with gauze dressings, boric ointment, normal salt solution, hydrogen peroxid, and many other materials have been used. Most treatments which need an additional gauze or cotton protection cause severe pain when the dressings are removed

Fig. 315.—1, Healed burns of hands, face, and back. No effort was made to avoid contracture of left wrist. This has since been corrected by a plastic flap operation on the left forearm which permits the hand to come into full extension. 2, Healed body burns. A strong cicatrix binds the left arm to the chest, a deformity easily avoided if a preliminary orthopedic thought had entered the mind of the surgeon. The arm was freed, maintained in complete abduction, and the denuded area has since healed over without skin-graft. Adhesive tape dressing. 3, Back view of No. 2, showing extent of binding scar. 4, Fresh burns healed in the tented beds by electric light and application of 5 per cent. argyrol. Recovery. 5, Nearly healed burn of buttocks. Adhesive tape treatment on residual areas. 6, Healing burn of back. Under adhesive tape dressing this has now been completely epidermized.

after the patient reaches the hospital for permanent treatment. Gauze is bad enough, but cotton stuck over a burn leads to great difficulty in removal. It is better in the long run to leave the burned area uncovered by dressing. Picric acid is the most useful first-aid application when one is needed. If the patient can be taken very quickly to a hospital, the first treatment which inaugurates the permanent treatment can be given there.

Frequently the patient is in such extreme shock that little attention is paid to the actual burn. Rest and stimulation are necessary. If the patient is in pain, morphin is indicated. Sometimes they are completely apathetic and have no complaint, but are in extreme shock. Hypodermoclysis is not suitable, intravenous administration of normal salt or 5 per cent. sodium bicarbonate solution being the best procedure. When the buttocks are not involved, stimulating enemata may be given. To decrease pain, continual complete warm baths of sodium bicarbonate solution may give relief. However, the results are no better than in dry treatment. Dry methods, some combined with open-air treatment, have been popular at times. Burned areas are powdered with zinc stearate or boric acid or other mild powders, and the resulting crusts being left in place favor epidermization. Sometimes these powdered areas are covered with dressings; at other times they are left to the desiccating effect of the open air. Every one claimed good results for the treatment, but few told of their mortality and the exact amount of pain and distress the patients suffered.

No standard treatment is offered American surgeons—every known application and method has its deficiencies. The method of choice is one which relieves pain and induces rapid healing with a minimum proportion of resulting cicatricial tissue.

About thirty years ago Barthe de Sandfordt, in China, developed his mixture of paraffin and resin, which was marketed under the name of ambrine. This patented preparation did not become popular in America until men like Sherman, who dealt with many burns, took it up and verified its merits. This use of ambrine is called the closed method of treatment of burns, and its value has been firmly established not only by the results

obtained by de Sandfordt at Issy-les-Moulineaux during the war, but by the ratification of American surgeons.

On our service in the County Hospital we use two methods—this closed method with ambrine, and the open method, applying 5 per cent. argyrol to the burned areas. In younger children we find that ambrine will not stick satisfactorily; the children pull at the wax or turn about, so that its protective value is lost. For these patients we use an ordinary child's bed with high sides, enclosing the whole in sheets which permit entrance through a flap on one side. In this tent-like arrangement we hang an electric light, which furnishes both heat and light. The youngsters are stripped and are placed in these beds on sterile sheets. The heat from the light keeps them comfortable and dries the burns, which are daintily touched three times a day with 5 per cent. argyrol. If the back is burned the child lies prone; if his abdomen or chest is burned he lies supine. When there is a tendency on account of the location of the burn for an arm or leg to contract, we tie it loosely to the bed end or side and tilt the bed in the opposite direction. There are no dressings to be done; the sheet in the bed must be changed as often as needed. Scabs and crusts are not picked off; they are allowed to dry and come away of themselves. When the patient recovers sufficiently to become ambulatory the remaining granulating area is treated by the adhesive tape method, laying on narrow strips to completely cover the granulations, never cauterizing them, and changing the tape every second day. We have to do very few skin-grafts. In general, the closed method with ambrine is the best treatment, and should become a national standard treatment until something better appears. All burned individuals should be hospitalized. The technic of the ambrine method is as follows:

No matter what type of burn is present the area is thoroughly dried by an electric hot-air dryer, such as barbers and hair-dressers employ. A coating of ambrine is then applied by means of an atomizer or fine brush, covering the burned area completely, and extending $\frac{1}{2}$ to 1 inch beyond on to normal skin. A thin layer of cotton, or a single layer of sterile coarse meshed

gauze is laid on the paraffin, and this is covered with another layer of the wax put on either with a brush or atomizer and allowed to stiffen. This forms a waxy shell over the burn and protects the underlying part from the air, keeping it at a uniform temperature. It also promotes a rapid epidermization by acting as a protecting scaffold along which cells can grow. It also acts as a splint for the part and prevents contractions and cicatrization. Within twenty-four hours the secretion beneath the wax causes it to be elevated slightly and it can be easily and painlessly removed without destroying the proliferative epithelium on the surface beneath. The wound is again thoroughly dried and the wax reapplied. Any specially deep or suppurating points are sprayed with 50 per cent. hydrogen peroxid or washed out with normal salt solution before the drying.

Ambrine, the exact formula of which is not published, is a mixture of neutral wax and resin. If we do not care to use the patent medicine, we can use a neutral wax or paraffin which melts at 150° F. to a liquid almost as thin as water. This can be sterilized by heating to 250° F. for ten minutes, and is then used on the perfectly dried wound by means of an atomizer which has a water jacket. The spray of paraffin is applied at 150° F. This wax must not be brittle and must be ductile enough to spread out. This dressing is applied daily for three weeks. When infected burns with crusts and discharging pus are received they are treated by the Dakin solution until clean granulations form, then the wax application follows. The tissues should never be scrubbed or subjected to strong antiseptics, nor should granulations be cauterized.

It has been suggested that various stimulating medicaments should be added to the wax. Resorcin, oil of eucalyptus, betanaphthol, boric acid, etc., have been tried, but it appears to be proved by Sollman's experiments that these substances are held inert in the wax and fail to have any action on the underlying granulating surface.

CLINIC OF DR. CARL BECK

NORTH CHICAGO HOSPITAL

SUTURE OF NERVES AND TENDONS OF THE WRIST

Summary: Paralysis of the median and ulnar nerves the result of cutting the wrist with glass. Two attempts to secure a functioning hand practically successful.

THIS young man is nineteen years old. He had the misfortune to cut his wrist by glass falling from a door. The physician who was called immediately tried to unite the structures which had been severed, but evidently without success. Several months later he developed a paralysis of the median and ulnar nerves, a painful scar, and consequently loss of function in the afflicted areas.

An attempt is made at this late period to re-establish function by restoring the continuity of the nerves and tendons. The scar over the wrist is very carefully resected, and it is found that the flexor tendons are connected with the ligamentum carpi and that the peripheral ends of the tendons are retracted toward the inner part of the hand. The ulnar nerve has been severed below the pisiform bone and the ends are embedded in scar tissue. It is very difficult to find the peripheral end. After considerable dissection we find the very thin end. The proximal end is easily dissected. It is, however, hardly possible to bring the two ends together, and we therefore use a silk thread to unite them as close as possible. We surround this bridge with a piece of fascia taken from the fascia lata, surrounding the two nerve ends with a sort of sheath of fascia with its fat adhering to it, leaving the fat inside of the new sheath.

The tendons of the fingers are easily brought downward and united, not singly, however, but in a bunch of the proximal tendon end. This extends the flexed portion of the fingers.

Somewhat easier is the union of the severed median nerve. After dissecting all the scars we are able to unite the two ends

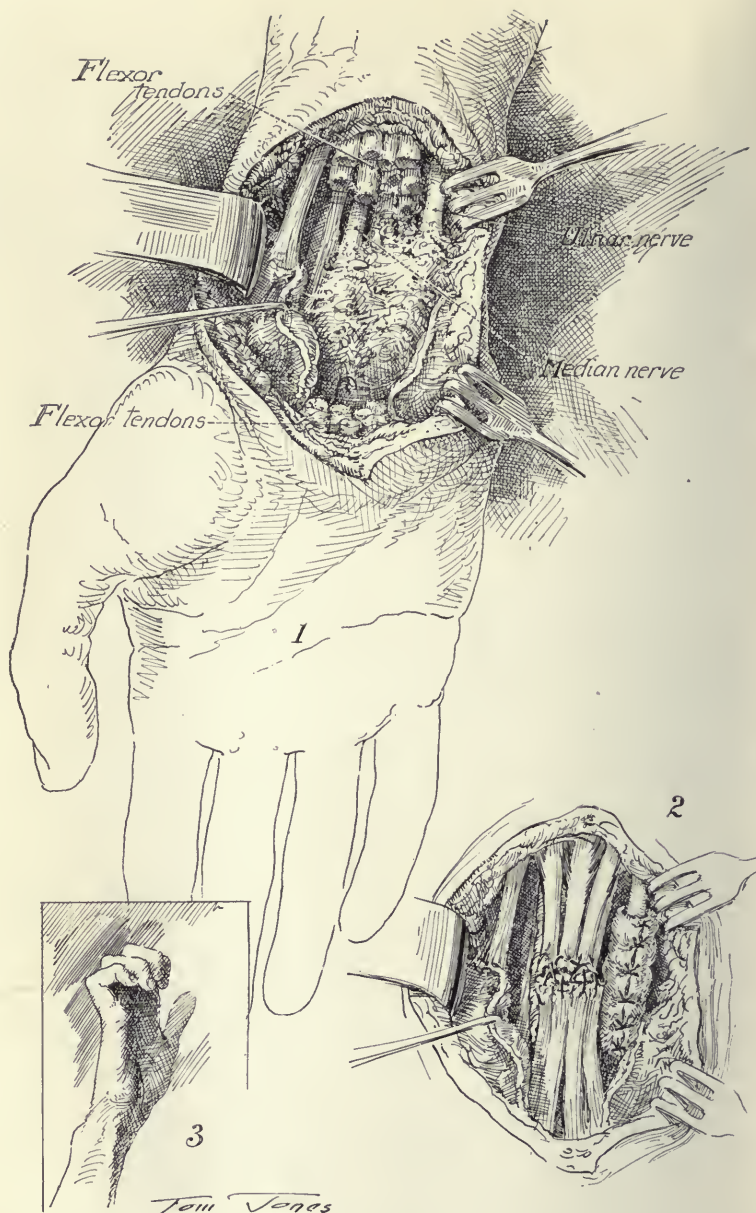


Fig. 316.

very snugly. We also surround this united nerve with a sheath of fascia and fat taken from the fascia lata. The arm is placed at absolute rest upon a splint and will be kept in this position for eight days.

After-history.—Unfortunately, a portion of the skin sloughed out. We very often observe this sloughing following operations of a similar nature. We cannot account for it in this case except that the nutrition of the skin in this neighborhood is rather poor and that the scar formation necessitated the removal of considerable portions of the skin. In many individuals it is necessary to stretch the skin to cover the defect. The skin of the volar surface of the hand is not very pliable and the skin of the forearm has to be stretched all the more. That produces a great deal of strain on the sutures and a necrosis often results.

There was some hyperflexion of the hand, but not complete. The slight necrosis of the skin led to a sloughing of the fascia, and the result was, therefore, unsatisfactory. There was union of the median nerve and the tendons. The ulnar nerve evidently did not unite, at least function was not restored after months of after-treatment.

A second operation was done to reunite the ulnar nerve and correct the abnormal position of the fingers (Fig. 316, 3). This flexion was brought about by the union of the tendons, which interfered somewhat with the stretching of the fingers, although physical exercise and electricity were used. The scar tissue was dissected out and the flexor tendons lengthened.

After several months of treatment there is fairly good flexion of the hand and, strange to say, the sensation is slowly returning. Parts of the fingers are still numb, but the largest portion has already acquired sensation.

Fig. 316.—1, Exposure of field and extent of injury. Note space between severed flexor tendons due to retraction, also large amounts of scar tissue which has developed around severed ulnar and median nerves. 2, The flexor tendons have been united in a group. The ends of the ulnar nerve have been approximated and sutured as well as possible, then surrounded by a tube of fascia lata with the fatty side turned in. The median nerve has been repaired in the same manner and lies beneath the tendons. 3, Abnormal flexion of fingers due to union of tendons which was corrected at a later operation.

CLINIC OF DR. ALFRED A. STRAUSS

MICHAEL REESE HOSPITAL

VARIOUS METHODS OF BLOOD TRANSFUSION AS MOST APPLICABLE IN VARIOUS AGES

Summary: Three cases for blood transfusion, each patient representing a different period of life. Method of transfusion must be adapted to the age of the patient and the condition of the veins. Technic of methods employed in present cases—direct syringe method; transfusion through external jugular vein; transfusion through superior longitudinal sinus. Beneficial results from blood transfusion last longer in children than in adults.

WE have this morning 3 cases for transfusion. One is an adult who has been bleeding from a large gastric ulcer of the lesser curvature, whom we will transfuse with 1000 c.c. of blood and then operate. The second patient is a child two years old, with a hemoglobin of 20 and a red count of 1,000,000. The patient has had repeated hemorrhages from the bowel without a positive diagnosis as to where the hemorrhage is from. We believe from our *x-ray* findings that this child has a congenital anomaly about 6 inches from the ileocecal valve, which is either in the form of a benign tumor or a bleeding Meckel's diverticulum. We will transfuse this patient, transfuse a second time within a few days, and then operate on her. The third patient is a case of congenital pyloric stenosis in an infant ten weeks old, on whom we operated thirty-six hours ago. The child is in such an emaciated condition that we can help it along greatly by giving it 75 c.c. of blood.

It can be very readily seen that we have here 3 cases for blood transfusion, each one in a distinct age, that of infancy, that of childhood, and that of adult life. A great deal has been written about the various methods of blood transfusion, and many arguments have been brought forth by different individuals

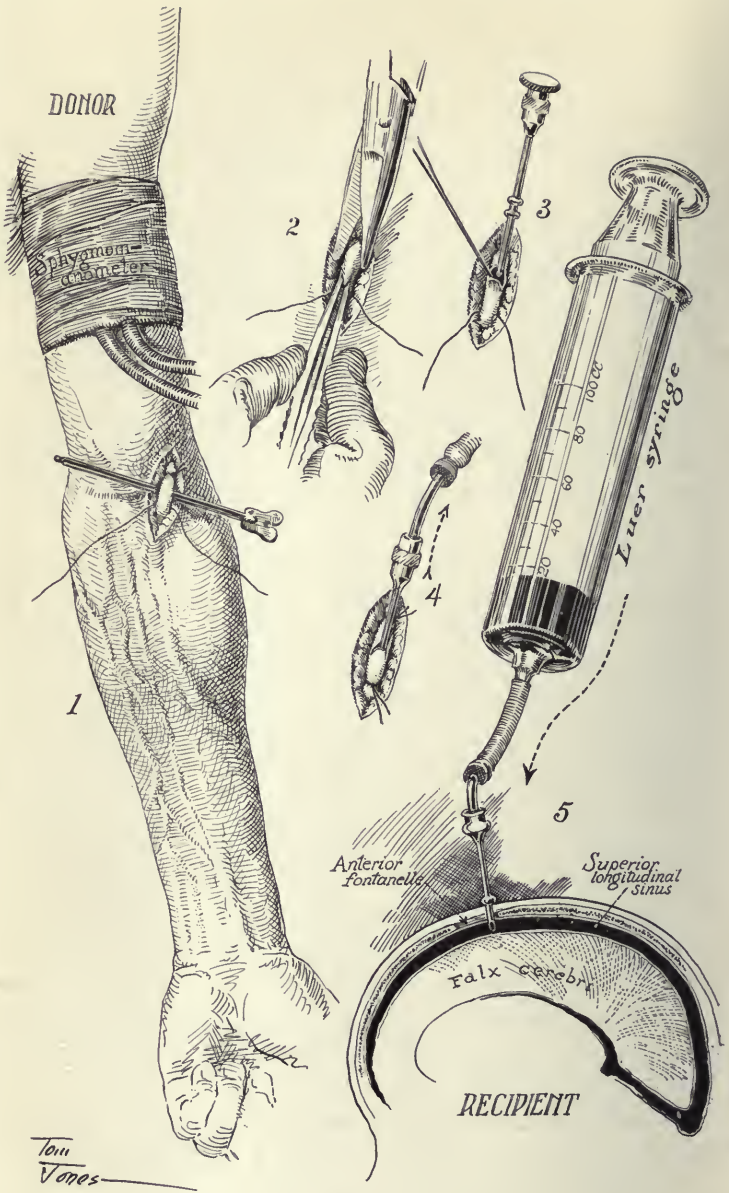


Fig. 317.

of the advantages and merits of one method over the other. As a matter of fact, there is no one method of blood transfusion that is applicable to these various ages; one method which is very practicable in an adult is impossible in an infant, and a method that is applicable in an infant is not applicable in a child. In other words, I would like to demonstrate that each individual age should have some particular method. For instance, in adults with large veins, especially if both the donor and recipient are males, and you have an intelligent assistant, one who is able to prepare your paraffin tube properly, then the Percy paraffin tube method is as practicable and as simple as any one method known. On the other hand, if the donor is a female with small veins, the Percy method is not as easy and practical as the direct syringe method, which we will demonstrate this morning on our first patient, the bleeding gastric ulcer. The technic is as follows:

A sphygmomanometer is placed on the donor's arm as high up above the elbow as possible. The column of mercury is held at 40, so as to obstruct the venous circulation and not interfere with the arterial. The skin area over the oblique vein is now injected with $\frac{1}{2}$ per cent. cocain and the vein exposed (Fig. 317, 1). The vein is now ligated on its proximal portion. A grooved director is placed underneath the vein and a second ligature placed on the distal portion (Fig. 317, 1). The area around the wound is soaked with sodium citrate solution, 2 per cent. strength. The upper circumference of the vein is now lifted up with a pair of small toothless tissue forceps and an oblique cut is made with a pair of fine scissors (Fig. 317, 2). A closed cannula with its plunger is placed in the vein, holding the upper lip of the vein open by means of an Elsberg hook (Fig. 317, 3). The cannula is now tied with the second or distal ligature (Fig. 317, 4).

Fig. 317.—1, Oblique vein exposed and ligated for transfusion by direct syringe method. 2, Incision into vein. 3, Closed cannula with plunger placed in donor's vein. Upper lip of vein held open by an Elsberg hook. 4, Cannula tied with second or distal ligature. 5, Method of transfusing an infant through superior longitudinal sinus. The Braun needle is inserted obliquely into the superior longitudinal sinus and is prevented from going through the sinus by a small fixed metal knob, situated $\frac{1}{4}$ inch from the point of the needle.

A cannula is inserted in the recipient's vein in exactly the same manner and with the same technic as in the donor, except that the cannula is pointed in the opposite direction, namely, toward the proximal portion, in the direction of the flow of blood in the vein. Both wounds are covered with a sponge saturated in sodium citrate solution.

Two 100 c.c. Luer syringes are now washed out in sodium citrate solution and a small rubber tube, about 1 inch in length, is attached to connect the syringe to the cannula. It is well for the donor to constantly work his hand and the muscles of the forearm so as to distend the veins with blood. The plunger is pulled out of the cannula, the rubber tube connected, and the blood drawn off, 100 to 120 c.c. at a time. The plunger is now replaced and the plunger from the cannula in the recipient's vein is pulled out and the blood transferred. The object of having two syringes is while one is being used the other one can be washed out with sodium citrate solution. The object of washing the syringe in sodium citrate is that it leaves a fine capillary layer of sodium citrate in contact with all parts of the syringe and prevents any tendency to blood clotting. In this way no time is lost. There is one advantage of the 100-c.c. syringe method, namely, that the patient does not get a large volume of blood at one instant, but is getting 100 c.c. at a time which will not overtax the circulatory capacity or the heart. I believe this has some advantage over the Percy method, in which 800 to 1000 c.c. of blood are passed into the circulation within a few minutes. In the method we are employing this morning there is always an interval of two minutes between each injection of 100 c.c. of blood.

The next patient is the child, two years old, with very low hemoglobin and very low red count, whose general condition is so bad that I believe two repeated transfusions will fit the child much better for operation than one single transfusion. I have done this repeatedly in young children in whom I had to do major abdominal operations. In a patient where the hemorrhage is a slow oozing type if transfusion is done he will eat, drink, and pick up very markedly for five to eight days, when another

transfusion is given, and then operation performed. To my mind this is much better than to give a child in such a precarious condition one transfusion and then operate.

In a child two years of age it is very difficult to get a vein in the arm that will do for transfusion. For this reason I believe the external jugular is the simplest and best vein to use (Fig.

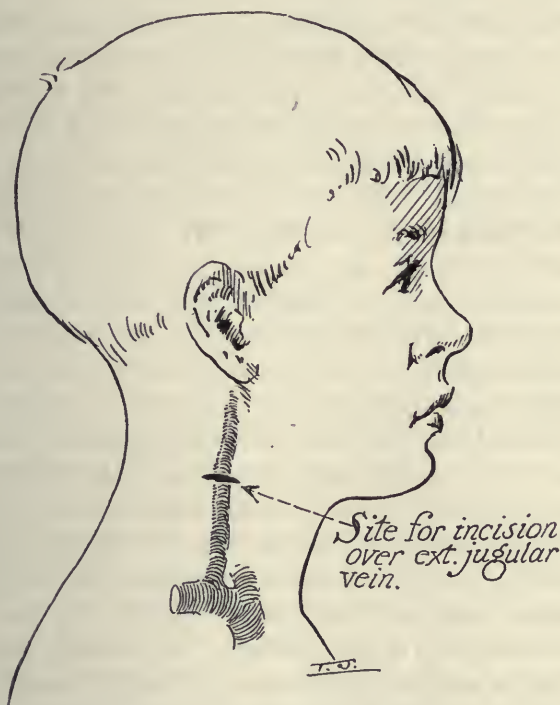


Fig. 318.—Transfusion through external jugular vein. This method is employed in infants where the anterior fontanel is closed and in children up to six years of age.

318). I use the external jugular in all infants where the anterior fontanel is closed and in children up to six years of age. The method of transfusion is exactly the same as I described in the first case, except that the cannula in the recipient is placed in the external jugular vein. In a child of this age usually 150 to 250 c.c., varying with the size of the child, is sufficient; in other

words, all that we need here in this patient this morning is about two syringefuls of blood.

The third case is the infant ten weeks old. On account of his impoverished condition and low vitality I feel that I can help his vitality greatly, as I have done in many cases, by giving 50 to 75 and occasionally 100 c.c. of blood.

Now the simplest method of transfusing such a child is through the superior longitudinal sinus. The landmark to insert the needle is the posterior portion of the anterior fontanel where the two parietal bones meet in the midline. We believe that in these young infants the chemical changes which produce non-compatibility, such as coagulation and hemolysis, are not present, and for this reason we have always used the practical method of taking the blood from the mother. We have transfused a very large number of infants not only for this condition but for many other conditions, such as anorexia, malnutrition, and anemias of all forms, and at no time have we ever tested the blood of the donor and recipient as to their compatability. In no single instance have we ever found any bad results therefrom; 50 to 75 c.c. of blood are withdrawn from the mother's vein by the needle or by the cannula method, such as I demonstrated in the previous cases, and while the assistant fills the syringe from the donor I plunge the Brown needle (Fig. 317, 5) into the superior longitudinal sinus. The landmark for placing this needle is on the posterior portion of the anterior fontanel where the two parietal bones meet in the midline. The needle is inserted obliquely and is prevented from going through the superior longitudinal sinus by a small fixed metal knob, situated $\frac{1}{8}$ inch from its point (Fig. 317, 5). If the needle is in the superior longitudinal sinus you will get a free run of blood with a fair amount of force. If there is simply a small oozing of blood the needle is not in the sinus. The syringe is now attached to the Brown needle and the blood transferred. I believe this is a very simple and practical way of transfusing infants. We have transfused a very large number of them and we do the transfusion right in the dressing room with very little preparation.

I believe when the fontanel is open this is the simplest and

easiest method of transfusing infants. In children where the fontanel is closed the external jugular should be used by the above-described cannula-syringe method. In children over ten years of age the veins in the arm can be used. In adults who have very large veins the Percy method is ideal. Where the donor has small veins the cannula-Luer syringe method is much simpler.

Just a word regarding the grouping of donor and recipient as to their compatibility. I believe this is very important in adults and children, but absolutely unnecessary in infants. I would like to call your attention to the fact that in all transfusions we have done in the newborn and infants up to one year of age we have never tested or grouped the blood for hemolysis and coagulation, and we have never had any ill results from such transfusions. We usually use the mother or father of the infant as the donor.

In general, transfusions in children up to twelve or fifteen years of age seem to hold longer and last much better, especially in the anemias, than in adults. This is hard to explain except on the basis that the red cells and chemical substances in the plasma of the blood are able to adjust themselves to the new blood in the young individual during this developmental stage much better than in the adult where the plasma and red cells have reached greater maturity in development. We have also noticed that in chronic anemias where we have used from time to time four or five donors for the same recipient, although the grouping of blood as to hemolysis was proved, the end-results of such transfusions from the various individuals differed very markedly. For instance, a transfusion from one donor would hold in the individual for four to six months, while in the next transfusion from another donor, although of the same group, the recipient would be anemic within four to six weeks. I believe, therefore, that there is some other chemical equation and finer chemical changes, probably in the plasma of the blood, which we should look for in the grouping of bloods to make them compatible.

CLINIC OF DR. ALBERT J. OCHSNER

AUGUSTANA HOSPITAL

RUPTURE OF GALL-BLADDER INTO DUODENUM

Summary: Patient complaining of chills and vomiting is found at operation to have a rupture of the gall-bladder into the duodenum with a large stone lodged in the duodenal opening. Operative treatment.

THIS patient, A. S., No. 61,933, came to the hospital March 2, 1920 complaining of chills associated with vomiting. There is no pain associated with these attacks nor is there any regularity as to occurrence. No relationship to the taking of food is found. These attacks began about one year ago. At first they came on about once a month, seldom oftener. Recently the attacks have come at shorter intervals of from a week to ten days. The patient has never been jaundiced and he has never noticed any clay-colored stools during or after these attacks. The vomitus consisted of whatever he had eaten at a previous meal, and rarely was there a greenish hue to it.

Past History.—Thirty years ago patient had typhoid fever. There were no complications. The patient has been told that he had a slight attack of diabetes for the last five years with only a slight trace of sugar in the urine. Appetite is fair. Weight has remained the same, bowels are slightly constipated; nocturia twice during the night.

Marital.—Patient has been married thirty years; wife is living and well; 5 children living and well. There have been no miscarriages.

Family History.—Mother died of tuberculosis of the bowels. Father died of Bright's disease. Otherwise the family history is negative.

Physical Examination.—Patient is a well-developed and well-nourished adult male.

Head.—Scalp is negative, no points of tenderness. Ears are negative; pupils are equal, regular, and react promptly to light and accommodation. Scleræ are clear.

Mouth.—All teeth are missing in upper jaw. Lower teeth are in a fair state of preservation. Tongue, tonsils, and pharynx are negative.

Neck.—Negative to examination.

Chest.—Lungs are clear. Heart is not enlarged. Heart sounds are clear and regular and there are no murmurs. Pulse is equal and regular, 86.

Abdomen.—There is some tenderness to palpation below the right costal arch over gall-bladder. A second tender point to palpation is over duodenum. No masses can be felt. Liver, spleen, and kidneys are negative. Orifices are negative.

Genitalia are negative.

Rectal.—Few external tags are present. Sphincter has good tone.

Prostate is negative.

Extremities are negative.

Reflexes are equal and active.

Fluoroscopic Examination.—The chest reveals no pathology. The barium meal enters the cardia readily. The stomach is of a steer-horn type and moderately large. There are no incisuræ or tender points. The peristalsis is normal. The duodenal cap is readily seen and is regular, but over the duodenum the patient is quite tender to palpation. This is also true over the gall-bladder area. The stomach is mobile, but the duodenum is somewhat fixed.

Roentgen Diagnosis.—Cholecystitis, chronic, with adhesions to the duodenum.

Laboratory findings: Urine, twenty-four-hour specimen, 2160 c.c.; specific gravity 1.005, alkaline, albumin and sugar negative; microscopic examination negative.

Blood: Erythrocytes, 4,480,000; leukocytes, 11,500.

Differential count shows 18 per cent. small mononuclear and 56 per cent. large mononuclears.

Repeated smears stained with Wright's stain were negative for *Plasmodium malaria*.

Chills and vomiting are rather an odd combination. Malaria would cause the chills and vomiting, but there is no regularity of occurrence, as is usual with the different forms of vomiting. Blood-smears reveal no parasites. Brain tumor can be ruled out because there are no symptoms of brain tumor; the vomiting is not characteristic, there are no headaches, vision is not impaired, pulse is full and regular, and there is no papillo-edema. Appendicitis might cause this train of symptoms, but he has never had any pain associated with the chills and vomiting. However, this does not rule it out. On physical examination there is no tenderness in McBurney's region. So, to all intents and purposes, the appendix is not the offender.

The crises of tabes often cause a similar complaint, but in this patient the knee-jerks are active and equal, the pupils show no sign of lues, there is no history of lues, and the marital history is negative.

Pylorospasm due to an infected gall-bladder or appendix has to be considered. This may cause the vomiting. The appendix has been ruled out and this leaves the gall-bladder. The patient had typhoid fever thirty-five years ago, so we would think of an infected gall-bladder with stones. This could cause a pylorospasm with vomiting. An obstruction is to be thought of, but the history would rule it out. It would have to be intermittent and low down.

From the physical examination, the history of typhoid, and the fluoroscopic examination we get clues that point to the gall-bladder. The tender point in the abdomen is over the gall-bladder. Whether there are stones is difficult to say, but an impacted gall-stone low down in the neck of the gall-bladder frequently gives rise to the symptoms we have in this case. There have been no clay-colored stools or attacks of pain, so apparently the bile is being delivered to the gastro-intestinal canal, although this occurs very frequently in the presence of gall-stones.

There is some infection, as evidenced by the leukocytosis. Taking all the facts into consideration, we are brought to the diagnosis of a chronic cholecystitis with gall-stones and adhesions causing a severe pylorospasm.

Active diabetes has been ruled out by repeated urine examinations, the patient having eliminated sugar from his diet for a considerable period and reduced the consumption of starch to a small amount.

The patient's suffering is so extreme and his general condition is failing so rapidly and to so marked an extent that surgical interference is indicated.

Although the patient has not lost much in weight, both he and his friends and the physician in charge are convinced that the patient's condition is rapidly becoming serious.

It is possible but not likely that the irritation caused by the long-continued presence of gall-stones has given rise to the development of carcinoma aside from the adhesions. Neither the character of the chills, the absence of pain, nor the appearance of the patient speak for the presence of carcinoma.

In cases of this type it is always wise to operate at the earliest date possible, because there is no possibility of spontaneous cure, and while one procrastinates the patient loses in strength and his resistance is weakened by the absorption of septic material from the infected gall-bladder.

Operation.—The patient is asleep and the abdomen relaxed. We will make a high right rectus incision, for then it is possible to examine the lower abdomen. The abdomen is open and you see a mass of adhesions. By carefully examining we find that the duodenum, liver, omentum, and the hepatic flexure of the colon are adherent. I will extend the incision down 1 inch and examine the appendix. It is small and cicatricial, with few adhesions. It is much better out, so I will remove it. It takes just a few moments, and you are never sure as long as it remains in the abdomen when it will again cause trouble. Loosening these adhesions and ligating all bleeding points, I find that the gall-bladder is adherent to the duodenum. By catching these adhesions between forceps it may be possible to free the gall-



Fig. 319.—The gall-bladder which was adherent to the duodenum is here shown freed and lifted up revealing the rupture into the duodenum and a large stone lodged in the duodenal opening. 2, Hole in duodenum closed transversely.

bladder. Before that is done I will pack these gauze sponges around the field of operation so as to wall off the rest of the abdomen. If any infectious material or bile escapes it will be taken up by these sponges. In trying to separate the adhesions the gall-bladder suddenly comes loose from the duodenum, and you can see that the gall-bladder had ruptured into the duodenum (Fig. 319, 1). In the communicating opening of the duodenum there is a gall-stone $1\frac{1}{2}$ cm. in diameter, which we will remove. The opening in the duodenum is closed with Lembert's sutures of silk, the suture line extending transversely in order not to narrow the lumen (Fig. 319, 2). The gall-bladder is atrophic and will never return to normal, so I will remove it. This will be quite difficult, for with all these adhesions and inflammation the tissues are very friable. First freeing the adhesions and tissues around the cystic duct, so that the hepatic and common ducts are located, I will sever the cystic duct above its junction with the hepatic. The cystic artery is caught with a round-nosed forceps, the forceps pointing toward the fundus of the gall-bladder. This will prevent catching the hepatic duct. The gall-bladder can now be shelled out. The cystic artery is ligated, but the cystic duct cannot be ligated because the common duct will not carry the bile. It is edematous and indurated and we must allow time for the inflammation to subside. A rubber tube is inserted into the hepatic duct after the cystic duct has been split down to the common duct (Fig. 320). The tube is sutured with fine catgut so as to hold it firmly in place. The bile is already escaping through the tube. Around this tube are placed four cigarette drains. These drains, together with the rubber tube, are brought out through the upper end of the wound. It is impossible to explore the common duct because of the induration and adhesions.

Before closing the abdomen a small tag of omentum is sewed over the suture line of the duodenum to prevent any new adhesions from forming, and also to take care of a leak if one should occur (Fig. 320).

The abdominal incision is closed in layers, silkworm-gut sutures being used for tension sutures. Around the drains and

on the skin sterile vaselin is applied to prevent any irritation of the skin. The tube will be allowed to remain about ten days.

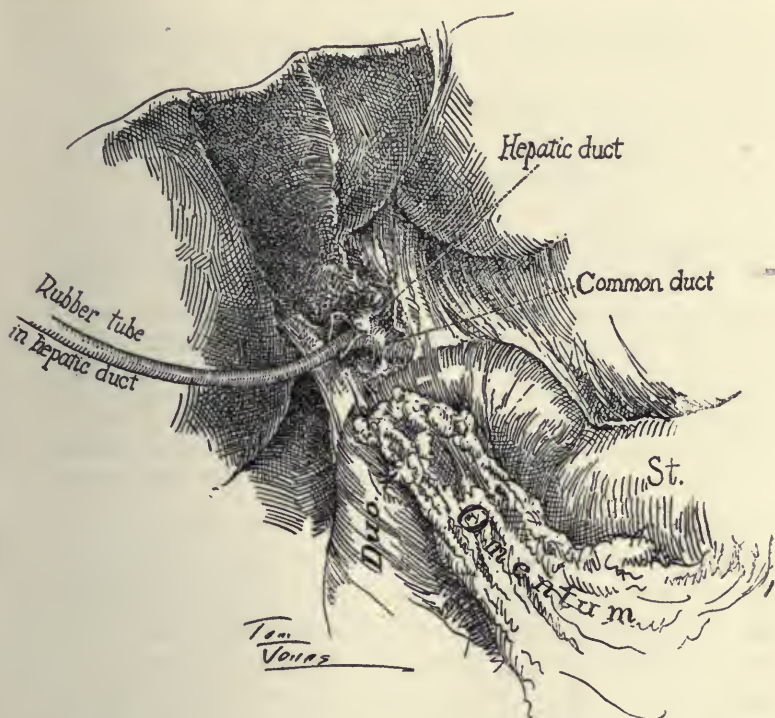


Fig. 320.—A strip of omentum has been sutured over the duodenal repair. The gall-bladder has been removed and the cystic duct split down to the common duct and a rubber tube placed in the hepatic duct and sutured.

The cigarette drains will be loosened about the fifth day and gradually drawn out.

CLINIC OF DR. DANIEL N. EISENDRATH

MICHAEL REESE HOSPITAL

INFECTIONS OF THE KIDNEY¹

Summary: Case I.—Perinephritic abscess secondary to carbuncle on neck; drainage of abscess; persistence of symptoms necessitating nephrectomy; recovery.

Case II.—Hyperacute exacerbation of a chronic pyelitis of the puerperium—erroneously diagnosed as gall-stones; medical treatment of no avail; nephrectomy with recovery.

Comments on renal infection—advisability of allowing nephrectomy incisions in these cases of severe infection to close by second intention. Routes of invasion in renal infections and causative organisms—pathologic changes in the kidney in these cases.

THE 2 patients whom I will present today illustrate different types of renal infection, a subject with which every one should be thoroughly familiar. The first case is an example of how a relatively insignificant primary lesion like a carbuncle on the neck may jeopardize the life of the individual as the result of a secondary metastatic focus in the kidney. The second case reveals the difficulty of cure in chronic pyelitis, and how the carrier of such a condition is constantly menaced by the dangers of acute exacerbations with spread of the infection to the kidney parenchyma.

CASE I. PREOPERATIVE DIAGNOSIS: PERINEPHRITIC ABSCESS (RIGHT) SECONDARY TO A CARBUNCLE OF NECK

Six weeks before I first saw this young man in consultation in an adjacent city, a furuncle had appeared on the back of the neck. The focus of suppuration gradually became larger until a carbuncle formed, which required incision. About two weeks after this the patient began to complain of a dull, aching pain in

¹ This is the first of a series of clinics by Dr. Eisendrath on Infections of the Kidney. The remaining ones will appear in subsequent numbers.

the lumbar region of the back and over the right upper quadrant of the abdomen. The diagnosis was made of an appendicitis, but changed later to that of a pyelitis. For two weeks before being seen by me in consultation the temperature had ranged from 100° to 102° F. The white blood count was 27,000. The urine contained a small number of pus-cells. A radiograph of the right side of the abdomen failed to show any definite evidences of a subphrenic abscess or of any change in the kidney shadow except an irregularity of the lower pole and a slightly higher right half of the diaphragm.

When first seen, percussion of the right lower chest revealed a level of liver dulness which was a little higher than normal and a minimal degree of excursion of the lower border of the right lung. There was a sudden cessation of the tactile fremitus at the same level at which the dulness began. As I have shown in a previous lecture¹ on the complications of appendicitis, such findings should arouse one's suspicions as to the possible presence of some condition in the right upper quadrant which has pushed up the corresponding half of the diaphragm.

Abdominal examination failed to reveal any rigidity even over the iliocostal space, but the right kidney was distinctly palpable and tender. The temperature was 103° F. rectal, pulse 124, and the young man appeared extremely ill. A diagnosis was made of right-sided perinephritic abscess and removal to this hospital advised.

Upon arrival here the temperature was found to be 102.6° F. (Fig. 321). The localizing signs were not any more definite than when first seen at his home. The tenderness (deep seated) over the right kidney was still present, but muscular rigidity was absent. A radiograph showed a displacement upward of the right half of the diaphragm.

Cystoscopy revealed a normal appearance of both ureteral orifices. Only the left ureter was catheterized, because all we desired to know was whether the functional capacity of this kidney would suffice in case removal of the right one became necessary. This question having been decided satisfactorily, an

¹ Surgical Clinics of Chicago, Vol. I, No. 5, p. 1014, Oct., 1917.

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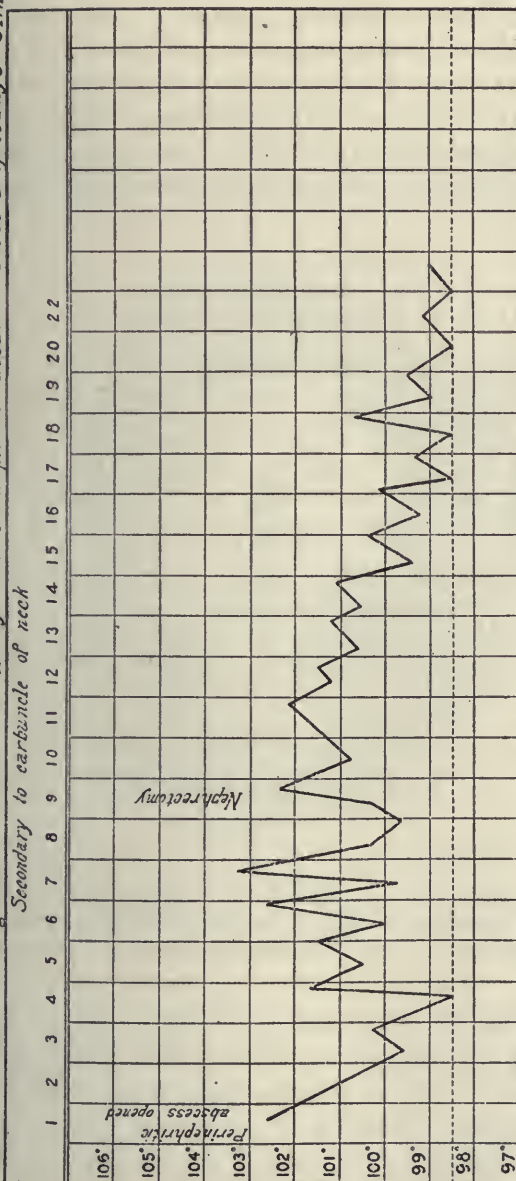


Fig. 321.—Temperature chart from Case I. Note fall of temperature following opening of perinephritic abscess, but owing to the fact that the underlying cortical focus (see Figs. 322-324) had not been controlled the temperature promptly recurred.

incision was made on the right side such as one employs for nephrectomy. Upon dividing the lumbar fascia a very thick greenish-yellow pus escaped in large quantities. The pus was very tenacious and widely distributed in the tissues around the kidney even up to the dome of the diaphragm, which explained the upward displacement of the latter as seen in the radiograph. The kidney itself did not seem enlarged, and further exploration

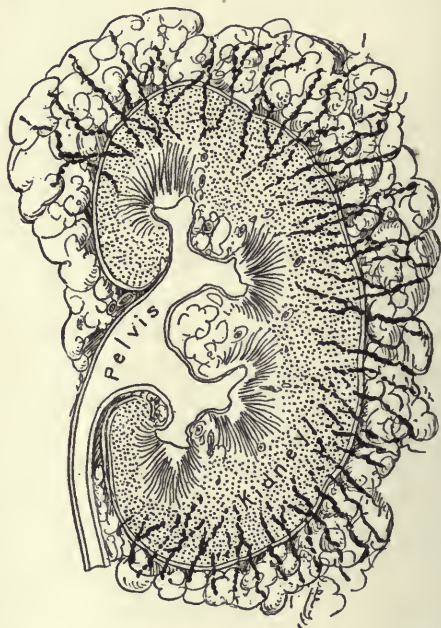


Fig. 322.—Relation of lymphatics of cortex of kidney to those of perinephritic fat. These penetrate the true capsule and permit of infection being carried from the kidney proper to perinephritic tissues.

was deemed inadvisable owing to the many dense adhesions. Drainage was provided for and the incision in the abdominal parietes closed. Cultures from the pus showed a pure growth of *Staphylococcus aureus*, thus confirming our preoperative diagnosis of a perinephritic infection secondary to the focus on the neck.

Experience in similar cases had taught us that very fre-

quently such a perinephritic abscess is secondary to a localization of the organisms in the cortex of the kidney, with extension either by way (a) of the lymphatics which pass through the fibrous capsule from the cortex of the kidney to the perinephritic fat (Fig. 322), or (b) by contiguity of infected tissues (Fig. 323). For this reason our prognosis was guarded and the possibility of further operative interference—*i. e.*, nephrectomy—explained



Fig. 323.—Conditions as found in Case I. The multiple abscesses in the cortex of the kidney were undoubtedly the primary area of localization of the organisms, the perinephritic abscess being secondary. As was stated in the discussion of this case, a primary localization in the perinephritic tissues is not uncommon.

to the relatives of the patient. That this was a wise precaution was demonstrated by the further course of the case. The urinary findings continued to be negative, but the fever persisted (Fig. 321) in spite of ample provision for drainage. The white blood count and pulse remained correspondingly high.

My suspicion that a focus in the cortex of the kidney was responsible for the persistence of the symptoms was confirmed

when we performed the second operation a week later. The wound was reopened and the greatly thickened fatty capsule found riddled with small collections of thick pus. The abscess which had been drained at the first operation had evidently been located in the loose cellular tissue between the diaphragm and the kidney, thus constituting one of the varieties of subphrenic abscess of extraperitoneal origin. The displacement upward of



Fig. 324.—Appearance of kidney from Case I after removal. Note the multiple abscesses at lower pole forming a conglomerate mass which caused a projection outward of the true capsule.

the right half of the diaphragm as seen in the radiograph was of great assistance in making the diagnosis of a perinephritic abscess.

The kidney was exposed and an elevation about the size of a hazelnut seen near the lower pole (Fig. 324). On the surface of this nodule there were about a dozen small purulent foci. The entire mass presented the appearance of a typical carbuncle as so often seen on the neck or buttocks, *i. e.*, a conglomeration of

parate furuncles. Excision being deemed inadvisable, a nephrectomy was performed.

The appearance of the removed kidney on section was a very peculiar one (Fig. 324). With the exception of the involved area there were no naked-eye changes. The pelvis appeared normal, hence the absence of urinary and of cystoscopic findings. At the lower pole (Fig. 324) was a mass formed by a large number of foci of suppuration, closely grouped and projecting considerably above the level of the capsule. We were evidently dealing with a hematogenous infection of the cortex which had extended into the fatty capsule (Figs. 322, 323) and from here to the subphrenic (extraperitoneal) space.

The convalescence was uneventful and the patient was discharged from the hospital about six weeks after admission, and, as you can judge from his appearance today (one year later), has remained perfectly well.

Comments.—This is unquestionably an example of a hematogenous infection of the kidney cortex with secondary involvement of the adjacent retroperitoneal tissues. The occurrence of such a metastatic localization is rather rare when one takes into consideration the frequency of suppurative lesions in the skin such as our patient had. Secondary hematogenous foci are found either in the kidney alone, with or without extension to the perinephritic tissues, or a metastasis may occur directly into the perinephritic fat, *i. e.*, independent of any primary focus in the kidney.

CASE II. HYPERACUTE EXACERBATION OF A CHRONIC PYELITIS

The second patient illustrates how a pyelitis of the puerperium may remain latent for a number of years, and then suddenly flare up in a hyperacute manner and give rise to the clinical picture of renal infection of the most severe type. In the interval this patient had recurrent symptoms which were diagnosed as gall-stones.

She was first seen in consultation about four months ago at her home some distance from Chicago. She was the mother of 4 children, 2 of whom are living. The youngest was four years

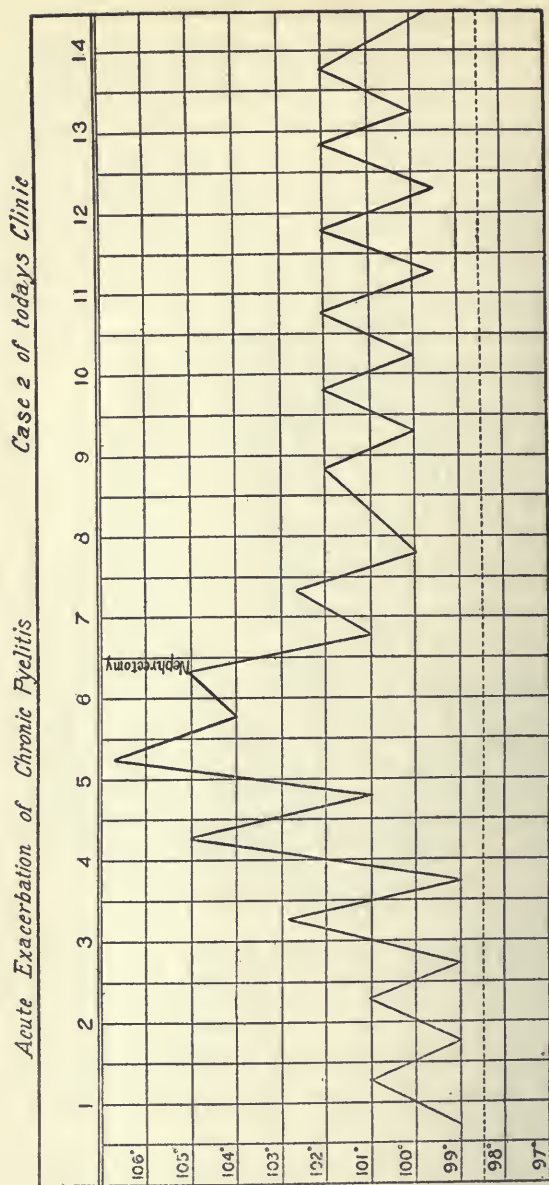


Fig. 325.—Temperature chart from Case II showing gradual rise to nearly 107° F. before nephrectomy was performed.

of age. Her present trouble began shortly after the birth of this child in the form of attacks of pain in the right upper quadrant of the abdomen, which radiated toward the kidney region of the corresponding side. These attacks were diagnosed as being due to cholelithiasis. She had never been jaundiced or had chills or local evidences of gall-bladder infection. Each attack lasted about one week. About five months before my first examination she had an attack of what was diagnosed as cystitis, lasting five or six days.

Her present trouble had begun two weeks before being seen by me. Her physicians, when I saw her in consultation, had found a mass in the right upper quadrant apparently in the region of the kidney, which was quite tender. Her temperature, which was 100° F. at the onset, later ranged between 99° F. in the morning and 102.8° F. in the evening. Toward the latter part of the second week there had been a sudden rise to 105° F. This temperature persisted without chills or any localizing signs referable to the kidney for four days. Upon the evening when I first saw her the temperature (Fig. 325) had risen to 106.8° F. (rectal). She seemed extremely ill and her lips were slightly cyanotic. On palpation of the abdomen one could feel a mass about the size of two adult fists in the region of the right kidney. This enlargement was quite tender. A diagnosis was made of acute infection of the kidney and transfer to this hospital advised.

Cystoscopic examination soon after admission revealed a much reddened and swollen trigone of the bladder. The left ureteral orifice was normal. The right ureteral orifice was prominent and red and the bladder mucosa in its immediate vicinity was also edematous and red. Clear urine of a normal character escaped through the left ureteral catheter, showing excellent functional capacity of this left kidney. It was impossible to catheterize the right kidney, but flakes of pus could be seen to escape from the orifice of the ureter on this side. *x*-Ray examination was negative except that it revealed a rather large right kidney shadow. A diagnosis of acute pyelitis was made and non-operative treatment instituted.

The persistence of the high fever (Fig. 325) necessitated a

change to operative treatment. The right kidney was exposed and the perinephritic tissues found extremely edematous. The kidney itself was greatly enlarged and intensely hyperemic, and the ureter and pelvis much thickened. On the surface of the kidney were innumerable red, punctate, hemorrhagic areas,

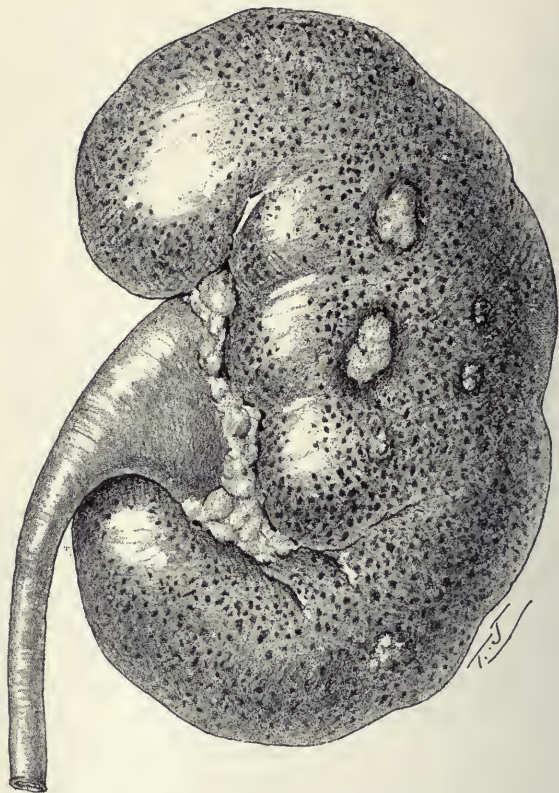


Fig. 326.—Appearance of surface of kidney from Case II showing innumerable hemorrhagic foci of infection and a few punctate and slightly larger areas of suppuration.

and also a number of pus foci, both of these varying in size from a pin-head to a millet seed, each pus focus surrounded by an intensely hemorrhagic zone (Fig. 326). On account of the evident presence of a diffuse infection of the kidney parenchyma nephrectomy was deemed indicated. This was carried out, and

the justification of this procedure is shown by the appearance of the exterior and a sectional view of the removed kidney (Figs. 326, 327). The pelvis also presented a large number of punctate hemorrhagic areas. The wall of the pelvis was greatly thickened and the ureter itself showed the typical thickened



Fig. 327.—Sectional view of kidney from Case II. Note punctate submucous hemorrhages scattered over renal pelvis, and the typical "streaks" of suppuration extending from medulla into cortex as seen at lower pole of kidney.

wall and dilated lumen (Fig. 328) which has been recently described by Braasch.¹ Examination of the kidney parenchyma on section revealed a number of yellowish streaks (Fig. 327) extending from the apex of the papillæ out toward the cortex, also several small, circumscribed areas of suppuration. The

¹Braasch: Jour. Amer. Med. Assoc., vol. 73, p. 731, Sept. 6, 1919.

wide-spread infection of the kidney parenchyma was confirmed later by microscopic examination. On the surface of the pelvic mucosa was a thick purulent exudate. Cultures from the renal pelvis and from the foci of suppuration on the surface of the kidney revealed the presence of the *Staphylococcus aureus* in pure culture.

Aside from a rather diffuse infection of the soft tissues along the line of incision, which required reopening of the wound, the patient made an uneventful recovery, and has remained perfectly well for the past four months following operation.

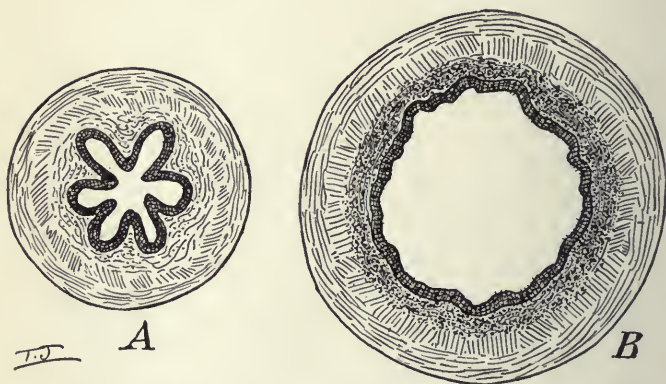


Fig. 328.—Cross-section of normal ureter (*A*) as compared with that of the ureter (*B*) of Case II, showing in a diagrammatic manner the typical inflammatory dilatation of the ureter.

Comments.—There are a number of most interesting features in this case: first, the appearance of the initial symptoms during her puerperium four years before the onset of the present rather fulminant symptoms. The diagnosis of “gall-stones,” made because of the recurrent attacks of pain in the right upper abdomen, is a mistake which is quite common. It is due to the fact that the average clinician does not think of the similarity in the clinical syndrome presented by infection of the biliary tract and that due to a similar condition in the kidney. The symptoms of ureteral colic so frequently found in cases of acute or chronic renal infection resemble very closely those due to cholecystitis with or without calculi. The latency of the symptoms as seen

in this patient is due to the fact that many cases of chronic pyelitis harbor organisms for years without giving rise to symptoms until for some reason or other the virulence of the bacteria is suddenly increased or there is some obstruction. Not infrequently, as in this case, renal infection may present the clinical symptoms of a bladder irritation in the form of increased frequency or painful urination. Had a thorough urologic examination been made at the time when the symptoms of cystitis and, later, those of pyelitis presented themselves, involvement of the kidney parenchyma to such an extent as was found today might have been prevented. I shall speak in a later lecture of what I mean by a thorough urologic examination.

When the patient was first seen by me it was impossible before operation to distinguish as to the extent of involvement of the kidney parenchyma, as it is advisable to avoid a thorough urologic examination during the acute stage of a pyelitis. I advised a trial of expectant treatment, *i. e.*, giving perhaps large quantities of water and urinary antiseptics, until the acute symptoms had subsided. On account of the extremely high temperatures in this case, and their persistence, operative interference rather than pelvic lavage became necessary, and was amply justified by the improvement in the patient's condition which followed.

It is a question in my mind whether or not it is advisable to attempt a closure of the nephrectomy incision in these cases of very severe infection. I have recently observed that it is impossible to secure much union in spite of ample provision for drainage in all portions of the incision. I am strongly tempted in future cases not to close the wound, *i. e.*, to allow healing by second intention to occur, because in 2 of these cases I was obliged to reopen the entire incision, all the tissues being found riddled with areas of suppuration.

The pathologic changes found in the kidney were typical of an acute non-tuberculous infection. The great thickening of the wall of the renal pelvis and of the ureter and the inflammatory dilatation of the latter are pathologic changes to which I do not believe the average surgeon has paid sufficient atten-

tion. This explains why at times it is impossible to secure favorable results from repeated pelvic lavage. The results of this inflammatory dilatation are quite analogous to the changes found in the gall-bladder in cases of long-standing infection. The rigidity of the ureteral wall and the dilatation of its lumen favor stagnation through the inability of the musculature to contract upon the column of urine which is passing through it, and a condition results which is analogous to that found in cases of chronic cholecystitis, *i. e.*, a rigid wall incapable of expelling its contents.

You will more clearly understand the entire question of renal infection if I call your attention to the most salient points of the pathology of renal infection in the present lecture, and then in subsequent ones take up some of the various clinical pictures under which each appears and their treatment.

CAUSATIVE ORGANISMS AND ROUTES OF INVASION

The organisms most frequently responsible for renal infection are the colon bacillus and the group usually spoken of as the ordinary pyogenic organisms. The colon bacillus is found in 90 per cent. of the cases either alone or associated with one or more of the ordinary pyogenic groups of organisms. Of the latter, those which occur most frequently are the *Staphylococcus aureus* and *albus*, these constituting practically all the remaining 10 per cent. of the cases. In a certain proportion of cases of renal tuberculosis the tubercle bacilli are found associated with either the colon bacillus or with one of the pyogenic organisms. I have called attention to these cases of mixed infection in several of my recent papers¹ on the subject of tuberculosis of the kidney.

There are three general routes by which organisms enter the kidney, renal pelvis, or ureter. These are: (a) the hematogenous route, *i. e.*, through the blood-vessels of these respective structures; (b) by way of the lymphatics; (c) along the lumen of the ureter. In the first or hematogenous route the organisms are carried to the kidney from a primary focus in the teeth, tonsils,

¹ Eisendrath, D. N.: Southern Med. Jour., vol. 12, p. 679, Nov., 1919.

bones, etc. The first place of lodgment in the kidney proper is in the glomeruli, from which the infection extends along the tubules (Fig. 329) to the apices of the pyramids, with secondary invasion of the pelvis of the kidney. Hunner has recently di-

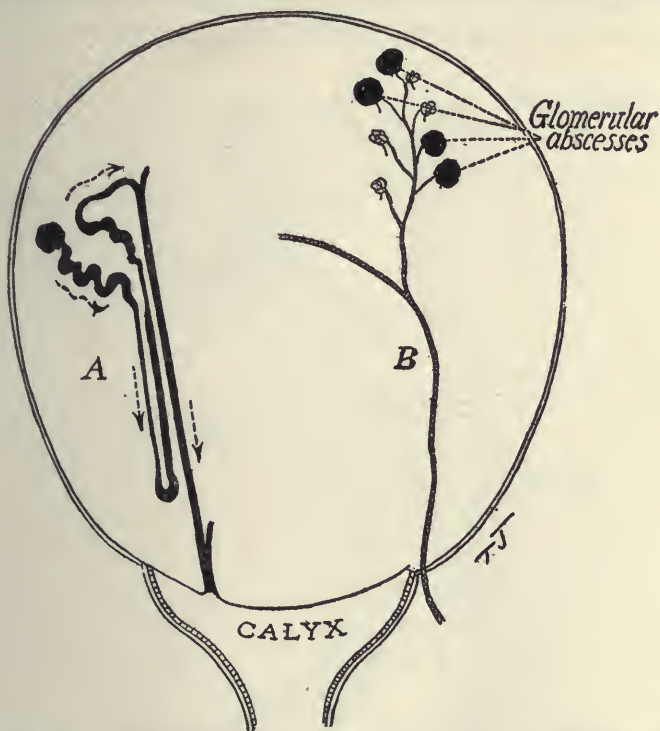


Fig. 329.—Diagrammatic representation of mode of localization of hematogenous infections of the kidney. *A*, Primary localization in a glomerular network with extension of infection downward through tubular system into apex of pyramid as indicated by arrows. This route explains how infection of one of the minor cycles takes place, and from here the entire renal pelvis is involved. *B*, Primary localization of organisms in glomeruli of kidney when carried by the hematogenous route with resultant glomerular abscesses.

rected attention to the fact that the hematogenous route thus explains many of the cases of ureteritis in the female, especially those in which a stricture is found. It is easy to understand how a focus of infection in any portion of the body can be followed through metastasis by infection of one or both kidneys. In-

volvement of the perinephritic tissues, as I have explained in connection with the first case of this clinic, may occur either primarily, that is, the organisms may be carried directly to the perinephritic tissues through the blood-stream, or the fatty capsule may be involved secondarily through extension from the primary cortical focus (Figs. 322, 323).

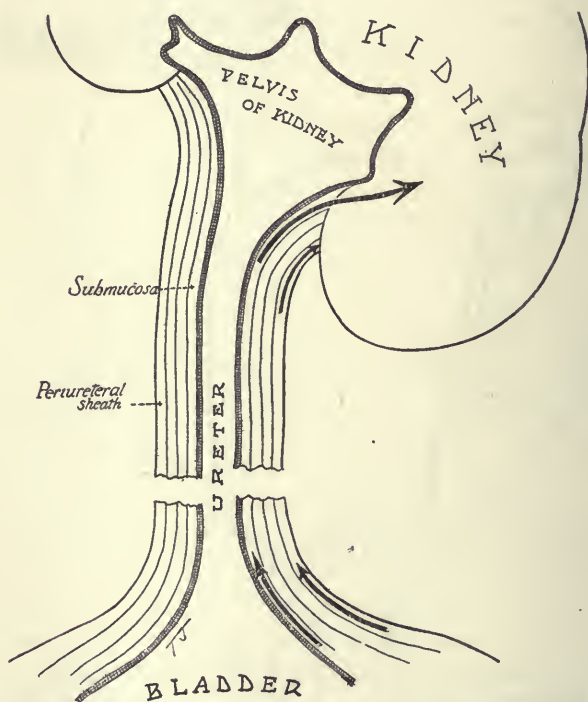


Fig. 330.—Diagrammatic representation of mode of spread of infection along submucous and peri-ureteral coat of ureter from bladder to kidney.

The second or lymphogenous route, although not fully accepted by many writers, is, I believe, destined to be of great value as a working hypothesis at least upon which to explain many of the cases of renal infection which do not present the characteristics of hematogenous invasion.

The lymphogenous route may be divided into two sub-groups: (a) those in which the infection is carried upward by the

lymphatics of the ureter from the bladder, prostate, seminal vesicles, and internal genitalia (Fig. 331); (b) those in which through communication of the lymphatics of the colon and the kidney (Fig. 330), as first demonstrated by Franke, to permit the organisms to be carried from the alimentary to the urinary tract without first passing through the blood-stream.

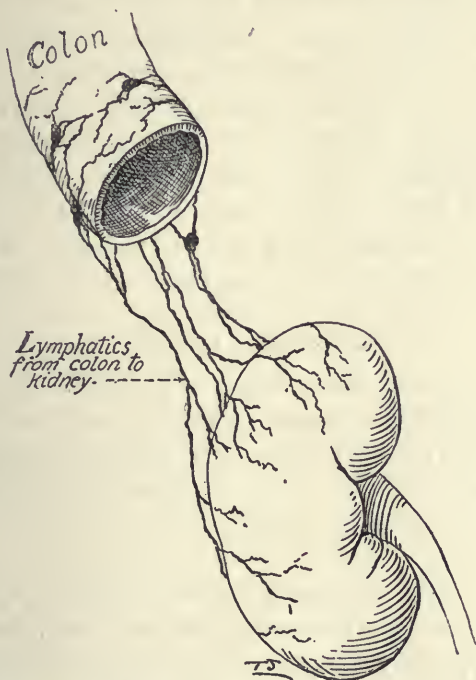


Fig. 331.—Diagrammatic representation of lymphatic communication of colon and kidney. (After Franke.)

Franke was the first to call attention to another route by which organisms could reach the kidney by way of the lymphatics. He was able to demonstrate the relation between the lymphatics of the colon and those of the right kidney (Fig. 331). His conclusion was that organisms can travel by this route without entering the blood-stream.

The third or urogenous route assumes that the organisms travel along the mucous membrane of the ureter or multiply in

the stagnant column of urine, and thus reach the kidney. It is difficult to understand how organisms should be able to migrate upward in a direction opposite to the secretory current, except when a more or less complete narrowing of the lumen of the ureter exists. It is generally accepted that any form of obstruction, whether intrinsic or extrinsic, of the urethra, bladder, or of the ureter or kidney pelvis itself, favors the spread of an infection of the upper urinary tract. The principal causes of such obstruction in the lower urinary tract are stricture of the urethra, hypertrophied prostate, bladder calculi, etc. Those of the upper urinary tract are: (a) extrinsic—spiral twists, kinks, inflammatory compression of the ureter, accessory renal vessels, or tumors which decrease the lumen of the ureter; (b) intrinsic causes, such as congenital and acquired strictures of the ureter, calculi, and benign and malignant tumors of the ureter or renal pelvis.

PATHOLOGIC CHANGES

Strictly speaking, involvement of the entire upper urinary tract is almost always present in every case of renal infection; hence it is more correct to speak of a ureteropyelonephritis than of infections of any one of the three component parts of the upper urinary tract, *i. e.*, of a ureteritis, a pyelitis, or of a pyelonephritis.

Clinically, however, the pathologic changes may predominate either in the ureter, in the renal pelvis, or in the parenchyma of the kidney itself. A pyelitis or ureteritis are rarely present without some microscopic involvement of the kidney parenchyma, and yet the clinical symptoms of the pyelitis or ureteritis may predominate. On the other hand, involvement of the renal parenchyma may completely overshadow that of the pelvis, both from a pathologic and clinical standpoint, as in our second case.

In the early stages of a hematogenous infection one observes on the surface of the kidney many minute foci of suppuration, each surrounded by an area of intense hyperemia. The cortex alone may at first be the chief seat of the pathologic changes, but as the infection progresses involvement of the entire parenchyma

so completely changes the pathologic picture that it is impossible in the majority of cases at a later stage to distinguish as to whether the primary mode of invasion was hematogenous or ascending, that is, from the lower urinary tract. The typical appearance of an ascending infection may be that shown in the specimen obtained from our second case (Figs. 326, 327). The streak-like areas radiating from the apices of the pyramids toward the cortex are supposed to be quite characteristic of an ascending infection, but, as I have said, where there is a more advanced involvement it is impossible to distinguish as to whether the primary mode of invasion was ascending or descending, that is, hematogenous. As the infection progresses in the parenchyma, necrosis of the kidney tissue occurs with the formation of cavities at the expense of the parenchyma until the entire kidney is converted into a series of pockets filled with pus and separated from each other by septa. This terminal stage is the condition so familiar to all of you as pyonephrosis.

If the obstruction at the ureteropelvic junction or in the ureter occurs at a relatively early stage the parenchyma, instead of being broken down, becomes compressed as a result of a dilatation of the renal pelvis and its calices. This sequelæ of infection is known as infected hydro- or, more properly speaking, ureteronephrosis. Pyelography is an excellent way of distinguishing between hydronephrosis and pyonephrosis. In the cases in which pathologic changes predominate in the renal pelvis, infiltration of its walls and those of the ureter are very important from a clinical standpoint, as I have already said in connection with the second case of today's clinic. This thickening of the walls prevents the renal pelvis and ureter from expelling their contents, and not only favors infection, but greatly prolongs it; hence it plays an important part in explaining the recurrences in cases of pyelitis, especially where some form of obstruction in either the lower or upper urinary tract exists.

There are two forms of pyelitis which have not attracted sufficient attention, namely, pyelitis cystica and granulosa. In the former condition one notes a cystic appearance of the entire mucosa of the renal pelvis, and this may extend downward so as

to involve the lining membrane of the entire ureter. In the second form of pyelitis the mucosa is covered by granulation tissue which may bleed and give rise to such severe hematuria as to simulate in every respect that due to a neoplasm.

From a clinical standpoint it is important to remember that any form of pathologic change may accompany calculi either in the ureter proper or pelvis of the kidney or in its parenchyma. The exact relation of renal infection to calculus formation is not clearly understood. We know, however, that a recurrence is not infrequent after removal of calculi in cases where infection coexists. Whether the formation of calculi is primary or secondary has not been absolutely determined. There is one striking feature about the pathologic changes in infection of the upper urinary tract that is true of infection in other parts of the body, namely, that much depends upon the virulence of the particular strain of organisms and upon the resistance of the host.

In our next clinic we will discuss two clinical types of renal infection, usually referred to as the pyelitis of pregnancy and the puerperium.

CLINIC OF DR. FREDERICK G. DYAS

COOK COUNTY HOSPITAL

COMPOUND FRACTURE OF FEMUR IN A CHILD

Summary: Difficulty in handling compound fractures of the femur in children. Method employed in present case. Value of open-air method—continuous use of antiseptic solutions devitalizes tissues and prevents healing.

THIS patient, a girl of twelve years, while playing in the street was run over by a truck. She was brought to the hospital with a compound fracture of the right femur badly contaminated with street dirt.

This type of fracture presents great difficulty in the way of treatment, both from the standpoint of reduction and fixation and of treatment of the infected wound. She was immediately given a prophylactic dose of antitetanic serum. A vertical Buck's extension was applied and the largest possible amount of weight attached, with the idea of extending the muscles and bringing about reduction and alinement of the fragments. In our experience the great difficulty with the use of the vertical extension has been the tendency of the fragments to sag posteriorly. This may be counteracted to a very large extent by flexing the leg upon the thigh to about a right angle. It is always possible to do this when a sufficient amount of uninjured skin is left below the wound in the soft tissues of the thigh. However, in those cases in which extension must be applied to the skin of the leg rather than of the thigh, it is impossible to flex the knee. In this case the wound was treated by débride-ment, and for a short time by Carrel-Dakin solution. Great care was exercised to protect the surrounding tissues from the irritating action of the solution by the use of vaselin gauze.

As soon as it was possible to discontinue the wet dressings the wound was treated by exposing it completely to the air. A large piece of mosquito netting was draped over the extension rope and allowed to hang down over the limb. This gave the patient great comfort, as she was spared the annoyance caused by daily dressings, in which the gauze pulls off the new granulations which become entangled in its meshes. Further, no raw

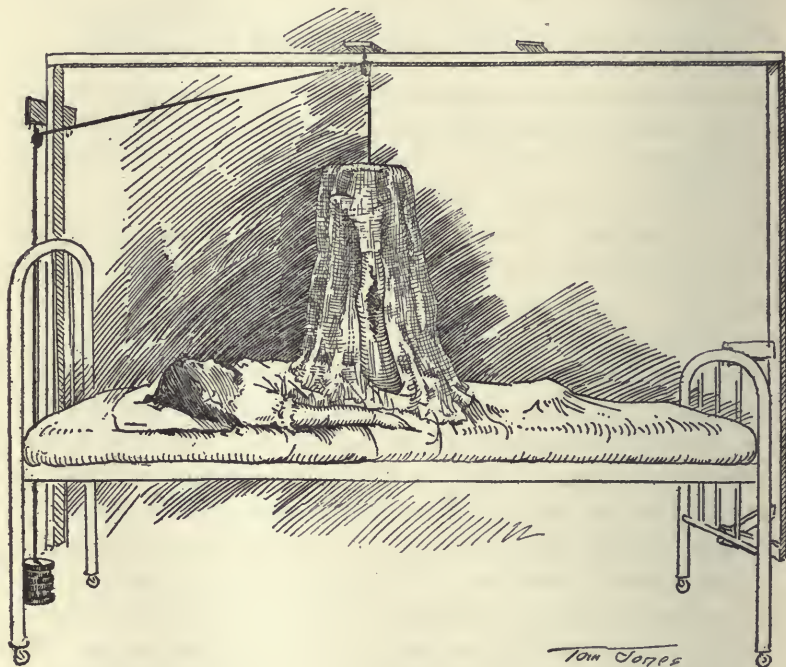


Fig. 332.—Compound fracture of femur with badly infected wound treated by the open method and vertical extension.

bleeding surface was left for the absorption of toxic material. For several days a large amount of desiccated serum and pus piled up on the surface of the wound. This was dissolved by the application of boric acid dressings for a period of twenty-four hours, when the crusts came off easily in large plaques and the open treatment was again resumed.

The denuded area is now well covered by scar tissue and epi-

thelium, obviating any necessity for skin-grafting. There is a firm union of the fragments of the femur with practically no displacement or shortening. It is believed that this method will reduce the treatment of compound fractures of the femur in children to the very simplest measures possible, bringing about the best results in the shortest space of time. It is to be added that in addition to the local treatment the patient was given forced feeding and, so far as possible, out-door treatment.

In this connection it is interesting to bear in mind that the principle of desiccation or dehydration of tissues for their preservation was recognized by the Egyptians in the preservation of their dead. It is well known that moisture devitalizes tissues, as illustrated by the edema and desquamation of the skin of women who have had their hands in soapsuds for the better part of the day. The Indians in their crude manner preserved meat by exposing it to the sun and wind, high up in the branches of trees. Its juice drained out and the sun and wind dried the tissues. This principle is equally applicable to the treatment of infected wounds. It is perfectly true that in many cases dressings are necessary for economic reasons in order that the patient may continue about his work, but a subjection of the tissues to continuous immersion in either antiseptic solutions or dressings saturated with pus devitalizes them and prevents healing. Furthermore, the exposure of pathogenic organisms to the sun and air brings about a lowering of their virulence. This method is used in the laboratory for the attenuation of bacteria. It is, therefore, incumbent upon us to dispense with wet dressings at the earliest possible time. This advance in the treatment of wounds is comparable to the advance made in the treatment of fractures in proximity to joints, namely, the subjection to early passive motion and mobilization.

CHOLELITHIASIS WITH BILIARY FISTULA DISCHARGING AT THE UMBILICUS

Summary: Patient presenting a discharging sinus at the umbilicus accompanied by attacks of gall-stone colic. Elongated gall-bladder adherent at fundus to under surface of umbilicus found at operation. Explanation of this phenomenon.

THIS woman is forty-four years of age. She comes to the hospital complaining of a continuous discharge of yellowish material from an opening in the region of the umbilicus. Five years ago she had a laparotomy for the removal of a tubo-ovarian abscess and shortening of the round ligaments. Her convalescence was normal and she was in good health until three years ago, when she began to have attacks of pain in the upper right quadrant of the abdomen, accompanied by nausea and vomiting and great tenderness on pressure in the region of the gall-bladder. She was not jaundiced at any time and the stools were not clay colored. She is unable to say whether or not she had any elevation of temperature or leukocytosis. These attacks of pain have come on without any regular periodicity and without great increase in severity, although in each attack it has been necessary for the attending physician to give a hypodermic of morphin. Aside from this her history is unimportant.

The clinical diagnosis before operation was fecal fistula and cholelithiasis. An incision is made about 1 inch away from the fistula into the abdominal cavity in order not to injure the bowel in case the diagnosis of fecal fistula is correct. On introducing the finger through the incision no bowel can be found adherent to the under surface of the umbilicus, but a tubular structure with a very thick wall is found extending upward to the under surface of the liver, where it is continuous with the gall-bladder. Upon palpation of this structure a hard mass, of the consistency of a stone, is found about its middle. In order to more thoroughly explore this structure it is necessary to enlarge the incision

in an upward direction, as is done for exposure of the gall-bladder and biliary tracts. I am tracing this structure upward. It is found to be a very much elongated and thickened gall-bladder, which is about the size of a banana, adherent at the fundus to the under surface of the umbilicus. The fundus is now freed, and upon its removal a mucoid substance can be pressed out. Upon freeing it further, a constriction is found about its middle, which when opened discloses the presence of gall-stones. The gall-bladder is now freed from the under surface of the liver and the cystic duct and artery isolated. These are tied with double catgut sutures and ligatured to prevent their slipping. In this connection I believe that if the dissection is carried down from above to the cystic duct, and then the cystic duct and artery lifted up on the finger, there is very little danger, if any, of including the common or hepatic ducts in the ligatures. The danger comes, I believe, in making the dissection from the cystic duct in a retrograde manner toward the fundus of the gall-bladder. The ligature is now firmly tied and the cystic duct is clamped in order that when it is amputated the contents of the gall-bladder may not escape into the peritoneal cavity. The bleeding on the under surface of the liver is controlled by pressure with hot sponges and the stump of the cystic duct is allowed to drop back into the peritoneal cavity. When in doubt as to the danger of including a portion of the hepatic or common duct in the ligature, it is much better to leave a considerable part of the cystic duct, as this structure will not lead to any further pathology if no stones are left in. In other words, it is better not to try to remove the last fraction of the cystic duct than to endanger either the hepatic or common ducts. The abdomen is closed with drainage-tubes extending down to the liver bed and the stump of the cystic duct.

While it is not very uncommon to find biliary calculi in other hollow organs contiguous to the gall-bladder, it is a very rare pathologic phenomenon to find an elongated gall-bladder attached to the parietal peritoneum discharging upon the surface of the skin. The gall-bladder, by reason of the mobility conferred upon it by its attachments and by the fact that dur-

ing acute inflammation it may become distended to many times its normal size, may extend in its distended condition to organs which are normally far remote from it. Under these conditions, its peritoneal covering being inflamed, it may become adherent to a loop of bowel or to the stomach, and during subsequent attacks the infected material of the gall-bladder, including



Fig. 333.—Enlarged and thickened gall-bladder attached by its fundus to the anterior abdominal wall and discharging its contents through a fistula close to the umbilicus. Cholecystectomy, with recovery.

calculi, may penetrate by ulceration into the organs to which it is attached. Biliary calculi have been found in almost every hollow viscus in the abdomen, but more commonly in the small bowel, ascending or transverse colon, or stomach. The escape of infective material from the gall-bladder into these organs frequently brings about a spontaneous cure, representing upon the part of nature the operation which is occasionally done in ob-

structive lesions of the common duct of forming an artificial channel between the fundus of the gall-bladder and the duodenum, a cholecystenterostomy. Ordinarily, once this fistulous communication is established between the fundus of the gall-bladder and the lumen of the bowel, stones may be passed without any pain because of the large lumen of the bowel. This results in spontaneous symptomatic cure. In other cases where the calculi are large in size and numerous they may reach a still larger size within the lumen of the bowel and produce an intestinal obstruction by occlusion of the lumen, or they may ulcerate through into the free peritoneal cavity exactly as they ulcerate through the wall of the gall-bladder into the wall of the bowel, resulting in a septic peritonitis.

It is unfortunate that the *x*-ray cannot give us definite information about the presence or location of biliary calculi except in a few cases. Under ordinary circumstances the calculi are not dense enough to cause a shadow when subjected to the *x*-ray. It is believed that in most of these cases subjected to operation it is better to remove the entire gall-bladder than to drain it, after separation from tissues to which it is adherent, because it is certain to give trouble in the future which will demand its removal.

After-history.—The patient made an uneventful recovery and left the hospital at the end of two weeks. The presence of the biliary fistula was not considered in the diagnosis because during her stay in the hospital from the inadequate history obtained through an interpreter no bile or stones had appeared, and the further fact that she had had a laparotomy seemed to bear out the probability of its being a fecal fistula.

TETANUS FOLLOWING A CONTUSED AND LACERATED WOUND OF LEG: RECOVERY

I WISH to present to you the history of a patient who has just recovered from a tetanus infection which followed an apparently insignificant wound of the leg.

The patient, a boy of nine years, was admitted to the hospital May 23, 1920 suffering from a contused and lacerated wound of the left leg. The injury occurred three weeks before admission, but caused no anxiety on the part of the parents until about May 20th, when it was noticed that the patient could not fully open his mouth, that he was very irritable, and had no appetite. The inability to open the mouth increased until only a space of about $\frac{1}{4}$ inch could be opened between the incisor teeth.

Upon admission to the hospital it was noticed that the boy rested tranquilly until disturbed by noises or by attempts at examination, when the muscles would suddenly contract, producing a moderate opisthotonos and causing great pain. It was possible for the patient to open the lips, but the jaws remained almost fixed, and any attempt to force the jaws open resulted in excessive pain and increased convulsions. There was rigidity of the neck muscles. On raising the child from the bed the whole body assumed a spasm of the tetanic variety and most exaggerated in the flexor muscles. All the tendon reflexes were present and exaggerated. A diagnosis was made of low-grade tetanus infection resulting from street dirt being ground into the leg wound.

The patient was treated by the administration of 5000 units of antitetanic serum intramuscularly on May 24th. The following day 15,000 units were given intramuscularly, the next day 10,000 intravenously, and on the fourth day 10,000 intravenously. Following the fourth injection the patient could open the mouth wider. His general condition was better. Two days later 10,000 units were injected intramuscularly. On

May 31st there was a marked increase in the aperture between the jaws and the child showed a normal temperature. On June 12th he was discharged well as to the tetanus, but was ordered to return daily to have the leg dressed. During the course of the infection the highest temperature was slightly above 100° F.; it did not exceed that at any time.



Fig. 334.—Tetanus. Illustrating lockjaw and expression of terror. Recovery.

This case represents a mild tetanus infection. It is to be remembered that there may be all grades of virulence in tetanus infections, just as there may be in pus infections. I had one case at Provident Hospital of a workman who fell from a scaffolding incurring lacerated wounds. He died within seventy-two hours of an extremely virulent tetanus infection. These



Fig. 335.—Tetanus. Tetanic spasm of skeletal muscles illustrating severe type of seizure.

cases, fortunately, are rare, the usual incubation period being from seventy-two hours to one week. The prophylactic use of serum is to be relied upon much more than its use as a therapeutic agent after the disease is once fully established. However, in those cases in which it is possible to relax the spasms, feed the patient, and keep up his strength for a sufficiently long space of time the force of the infection will wear itself out and the patient will recover. General symptomatic treatment and nursing are of the very greatest importance when this fact is borne in mind.

CLINIC OF DR. ALLEN B. KANAVEL

WESLEY MEMORIAL HOSPITAL

HEMATURIA

Summary: Demonstration of two cases, with analysis of the clinical picture presented by each. Necessity of thorough examination of every case of hematuria. Differential diagnosis of the causes of hematuria. Treatment of advanced carcinoma of the bladder.

LET me present briefly two patients with hematuria.

CASE I.—This patient complains of hematuria and frequent urinations, of burning on urination, of stopping of the stream during the act, and of pain on the left side of the abdomen.

His trouble began in 1915, with the appearance of a small amount of blood in the urine, noticed once or twice a year. These occurrences gradually became more frequent, until now he passes blood for a week or two at a time at intervals of three or four weeks. He has complained of dribbling for the past ten years and of burning on urination for the past year. At present he urinates eight or ten times during the day and five or six times at night. The stream stops several times during the act of urination. He has no acute pain, but a feeling of fulness in the rectum, and severe backaches accompanying the attacks of hematuria. He has had a "stitch in the back" for thirty-five years. He has never passed any gravel or small stones.

We have performed a suprapubic cystotomy upon this patient, and placed a tube in the bladder with a suction apparatus attached to it for draining off the urine. Though he is seventy-two years of age he is in good physical condition, and has not lost weight to a noticeable degree. He has no complaints except those that I have mentioned.

CASE II.—This patient complains of hematuria, of a burning sensation on urination, of frequency of urination, of suprapubic pain and pain in the back, and of loss of strength.

The patient states that she had never been sick until nine weeks ago, when the urinary symptoms mentioned came on very suddenly. She first noticed an attack of severe backache and abdominal pain while at church on Sunday morning. At noon of the same day she passed almost pure blood, which clotted very rapidly. During the afternoon and evening she had two similar attacks of pain during which, she says, bloody urine came in a gush and then stopped suddenly. On the following day she had two similar attacks. The bleeding then subsided somewhat until the following Friday or Saturday, when it was again severe and accompanied by weakness and dizziness. The patient consulted a physician, who gave her some dark pills that colored the urine like bluing. After two weeks she consulted another physician, who kept her in bed for two weeks. For another week she was treated with irrigations of the bladder, each one of which was followed by the instillation of black medicine. The hematuria became less after the end of the first week, and stopped entirely after the second week. The patient has not noticed any blood since.

Backache has been very severe with each discharge of blood. She describes the suprapubic pain as a feeling of pressure or constant fulness even when the bladder is empty. The burning has been present almost constantly since the onset of the trouble. At present she voids urine every few minutes during the day, and gets up at least six or seven times at night. She has felt weak since the end of the first week. Pus in the urine was first noticed by the doctor five weeks after the onset of the trouble. The patient states that the urine has been thick and "nasty looking" for a long time. She believes it was too thick to pass readily. Beyond these facts the history contains nothing of which I wish to speak.

The patient is seventy-two years of age and in excellent physical condition. The physical examination adds nothing bearing on the subject. The urine examination shows an al-

kaline urine, with a specific gravity of 1.030, loaded with pus-cells, red blood-cells, bacteria, and epithelial débris.

Both of these patients, you will observe, present a definite and important symptom—hematuria. I am drawing your attention to this subject because the presence of blood in the urine is a condition which demands serious consideration. A physician is not justified in giving only passing attention to such a symptom. It is not an obligation of the patient to prove that he has some serious condition producing hematuria; it is your duty as a physician to determine immediately the origin and nature of the hemorrhage; in the first place, because hematuria may indicate the presence of some serious pathologic condition which jeopardizes the patient's life, and in the second place, because the transitory character of the symptoms at the outset may lead you into neglecting to make a diagnosis until the opportunity for successful intervention is past. Let us first ask ourselves what are the common sources of blood in the urine. We know, for example, that bleeding from a varix in the pelvis of the kidney is not as common as hemorrhage from stone. We know that essential hematuria, so-called, is uncommon as compared with hemorrhage from a tumor of the bladder. In other words, I wish you to have a proper appreciation of the relative importance of the various causes of hemorrhage. You have perhaps seen few cases of hematuria, and if you go from this clinic simply with an outline of the causes of hematuria in your minds, you will approach your first cases with a wrong conception. You must realize that certain conditions are common and that others are very uncommon.

Of the pathologic conditions causing hematuria other than nephritis, the most common of all, the majority may be grouped under what we may call the "surgical conditions"—stone, tumor, and tuberculosis—in the order of their frequency. Each of these conditions presents a serious outlook for the patient; each is amenable to surgical treatment if diagnosed early. The presence of each should be carefully excluded before you permit the patient to leave your care.

Of the conditions which we have just mentioned it is rather characteristic that the hemorrhage is of an intermittent type. Not uncommonly these patients have periods in which they are entirely free from symptoms; perhaps they remain well for weeks or months. Later they have recurrence of the bleeding, and if the first physician has failed to make a diagnosis, perhaps they go to another physician, who follows the same careless method of treatment, gives some urotropin, and waits to see what will happen.

Eventually the tuberculosis, which at first was unilateral, involves the other kidney; or the pyelonephritis, which developed about an infected stone, results in a generalized infection that makes operation a hazardous procedure, or the benign tumor of the bladder undergoes malignant degeneration, and the patient dies from an inoperable carcinoma—because the physician who first saw the case failed to make a diagnosis.

When we attempt to draw conclusions as to the origin of the hemorrhage in these cases we find that the amount and character of the bleeding is of great importance. Blood intimately mixed with urine and accompanied by renal epithelium speaks strongly for hemorrhage from the kidney itself. If the bleeding originates in the bladder the patient may pass a considerable amount of almost pure blood, with little admixture of urine. Under such conditions the patient may have a sudden and severe hemorrhage and become very weak and dizzy, as this second patient did, owing to the ease with which the blood escapes into the distensible bladder. Symptoms of acute anemia are not uncommon following such hemorrhages, for the bleeding tends to recur when the bladder is washed out or emptied spontaneously.

In addition to hematuria in these cases there is commonly a pyuria, due to irritation and secondary infection of the kidney and bladder. If a stone, a tumor growth, or an enlarged prostate partially blocks the urethral opening there will be a certain amount of residual urine constantly present which still further favors the development of infection.

Although these three conditions—stone, tumor, and tuberculosis—commonly present the same symptoms, hematuria and

cystitis, nevertheless, by analyzing the patient's history and by making a careful examination, we can usually come to a definite conclusion as to the nature of the pathologic condition present.

In tuberculosis the first symptom is commonly increased frequency of urination and burning on urination. Associated with this there may be a small amount of pus and microscopic blood in the urine. If you are alert you will make a careful examination of a catheterized specimen of urine for tubercle bacilli, and if you do not find any, inject 20 minims of another catheterized specimen into a guinea-pig.

Cystoscopic examination may already show tiny ulcerations about the orifice of the ureter and inflammation of the trigone. Submucosal petechial hemorrhages may appear at the bifurcation of the small vessels. Later tubercles may be found in the bladder mucosa, the ureteral orifices may gape, due to the development of fibrous tissue about them, and the latter process may result in the formation of ureteral stricture. If a culture of the urine from the affected side shows a secondary infection, such as a colon bacillus or an ordinary staphylococcus infection, you may say to yourself, "This inflammation and ulceration is due to a colon bacillus infection"; but do not forget that in the majority of cases ulceration of the bladder is due to tuberculosis.

In this connection I wish to call your attention to Crabtree's method of examining the urine for tubercle bacilli, described in *Surgery, Gynecology, and Obstetrics*, February, 1916. He showed that since the specific gravity of tubercle bacilli is considerably less than that of pus, and only slightly greater than that of urine, if an infected urine is centrifuged by the ordinary method the sediment carried down will contain few, if any, organisms. If, however, the supernatant fluid remaining after the urine has been centrifuged for a few moments at slow speed is centrifuged for fifteen or twenty minutes at high speed, the second sediment should show tubercle bacilli in practically all cases suffering from renal tuberculosis. It is unnecessary to remind you that the urine should be obtained with a sterile

catheter to avoid contamination with the smegma bacillus, and that the centrifuge tubes must be absolutely clean.

Calculi may appear in the kidney, in the ureter, or in the bladder. Vesical calculi commonly originate in the kidney, and after reaching the bladder become enlarged by the addition of calcium or other salts.

A stone may be present in the kidney without giving rise to any symptoms whatever, the presence of blood or pus in the urine may be the first indication, or the excruciating pain of renal colic due to the onward movement of the stone may first call attention to its presence.

If the stone passes through the ureter, it may be discharged and the symptoms will entirely disappear. The passage of the stone is commonly accompanied by severe attacks of pain on the affected side, with pain radiating into the groin and testis, with frequent and intense desire to urinate, and with the passage of small amounts of bloody urine.

The passage of the stone makes the diagnosis certain. If it does not pass, an x-ray examination, made after thorough evacuation of the lower bowel, may reveal its location. If this fails, a cystoscopic examination will show blocking of the ureter on the affected side, or perhaps small amounts of bloody urine coming from the ureteral orifice. A wax-tipped catheter will sometimes show the mark of a stone, or an "x-ray catheter" passed to the site of obstruction will definitely localize it.

With a stone present in the bladder the patient frequently complains of a sudden stopping of the urinary stream, of increased frequency and burning upon urination, of pus in the urine, and intermittent attacks of bleeding. The bleeding may bear some relation to trauma and to activity. A tumor often bleeds at night while the patient is lying in bed; the hemorrhage associated with stone is usually induced by activity. The pain, burning, and increased frequency of urination are evidences of the cystitis which is practically always present. The stone itself may frequently be palpated with a sound. It can usually be detected by a careful cystoscopic examination, and in the majority of cases casts a definite shadow on a radiographic plate.

Of the tumors which occur in the kidney the most common, by all odds, is hypernephroma. The less common tumors include sarcoma, carcinoma, embryonic tumors, cysts, and the benign growths. It is not common with tumors to find blood in the urine early in the course of the disease, although it will appear earlier in sarcoma and carcinoma than in hypernephroma, since the latter tends to develop first in the cortex of the kidney and only causes hemorrhage secondarily by congestion of the blood-vessels, rupture of varicose vessels, and still later by ulceration into the pelvis of the kidney.

If upon examining a patient you should suspect the presence of a hypernephroma, and then learn that the patient had never had a hemorrhage, that fact should not lead you to rule out the possibility of a tumor. It is true that the first symptom in 25 per cent. of cases of tumor of the kidney is the passage of blood in the urine, but a patient may have a tumor for a considerable length of time without ever having any hemorrhage. In contradistinction to the hemorrhage associated with stone, the bleeding resulting from tumor of the kidney is independent of trauma and often painless, although the passage of a blood-clot down the ureter may give all the symptoms of renal colic.

Tumors of the bladder are much more common than those of the kidney. Dr. Kretschmer,¹ of Chicago, in a series of 238 cases of hematuria found 60 cases due to tumor of the bladder, about equally divided between benign and malignant growths, and 14 due to tumor of the kidney. Cabot,² in a series of 344 cases of hematuria collected from the records of the Massachusetts General Hospital, found 24 cases due to bladder tumor and 12 due to kidney tumor.

With both benign and malignant tumors of the bladder hemorrhage is commonly the first symptom. It may be slight at first, but is usually profuse, and more marked at the end of micturition. If the growth is filamentous, it may float in front of the urethra, and shut off the urinary stream just as a stone which lies free in the bladder. We must always remember in

¹ Jour. Amer. Med. Assoc., 1917, lxviii, 598.

² Differential Diagnosis, 1913, vol. i..

these cases the possibility of malignant degeneration of a benign tumor, and so the importance of making an early diagnosis.

The diagnosis is usually suggested by the history, and can be readily confirmed by a cystoscopic examination, unless the bleeding is so profuse as to render the growth invisible. The usual location of these tumors near the trigone helps to make the examination easier.

The last common source of hematuria is found in enlargements of the prostate, either of the simple hypertrophic or the malignant type. The history of slowly developing obstruction, of increasing cystitis, of the passage of small amounts of blood, together with the physical findings, should make the diagnosis easy.

So far I have confined my remarks to the more common lesions because I wish to impress upon your mind their frequency and importance. Hematuria may, however, occur in a considerable number of uncommon lesions. These may be considered under the grouping of general and local causes. Let us ask ourselves what general pathologic conditions we may have causing the appearance of blood in the urine. In the first place, any severe infection, such as typhoid, pneumonia, influenza, or smallpox, which results in inflammation and congestion of the kidneys may cause hematuria. Second, toxic agents like turpentine and phenol may be the etiologic factors. Third, diseases of the blood and blood-forming organs—scurvy, hemophilia, purpura, the anemias, and leukemias—may present an associated hematuria.

Of the local conditions producing hemorrhage we may have, first of all, trauma of the kidney; second, varicosities in the pelvis of the kidney; third, constriction of the renal veins because of abnormal mobility of the kidney; fourth, infarction of the kidney as in ulcerative endocarditis; fifth, simple pyelitis. Possibly out of 100 cases of hematuria 4 or 5 will be due to pyelitis. Bilharzia disease and filariasis are almost unknown in temperate climates.

The same group of local conditions causing hemorrhage occur in the bladder—trauma, varicosities, cystitis, prostatitis in par-

ticular. Severe bleeding will occasionally be met with in the dilatation of the bladder associated with spinal cord injury.

The urethra, as you remember, is divided into two portions, the prostatic and the membranous. One may find a posterior urethritis with ulcerations, trauma from the passage of a sound, or hypertrophy of the prostate with simple congestion. In these cases in which there is hemorrhage due to trouble in the prostatic urethra the bleeding is likely to occur at the end of micturition, due to the pressure downward of the sphincter on the inflamed area. If bleeding originates anterior to the prostatic urethra it appears at the beginning of micturition, and the last urine passed will be clear.

I have not yet spoken of the so-called essential hematuria. Essential hematuria is in the same class with cryptogenic infections. At times we use words to conceal our ignorance and essential hematuria is a case in point. If a man has hematuria, there is some cause for it. We are finding that some cases of essential hematuria are due to varicose veins of the pelvis of the kidney, and a considerable number of them are due to focal infections located in the papillæ of the kidney, followed by scar-tissue contraction and the formation of varicose veins in the papillæ. Other cases are due to small stones. In the privacy of your room you may speak of essential hematuria, but do not use the term to an intelligent patient or to a thoughtful member of the medical fraternity; just admit that there are some conditions in which we do not know the origin of the hemorrhage, and in which we must keep on searching for the cause.

If we return for a moment to the history of these patients you will remember the second patient complained of hematuria, suprapubic pain, of burning on urination, of frequency of urination, and of pus in the urine. She also said the urinary stream stopped suddenly and that the blood passed clotted rapidly. We would infer, therefore, that in all probability this blood came from the bladder, and that in addition to a lesion causing hemorrhage the patient was suffering from severe cystitis.

The first patient complained of hematuria, frequent urina-

tions, of stopping of the urinary stream, and of the symptoms of cystitis, although there is not a history of profuse hemorrhage as in the second case. In this case we must also assume that in all probability the hemorrhage comes from the bladder. Both these patients are seventy-two years of age. Both are at the age at which carcinoma is common; and the first patient, in addition, has hypertrophy of the prostate, which may be either a complicating condition or the primary source of his trouble. On cystoscopic examination we found in juxtaposition to the enlarged prostate a sessile, bleeding mass, and extending upward from it on the bladder wall a large ulcerated area about 4 cm. in width, with the typical appearance of an infected malignant ulcer. Under these circumstances what method of treatment ought we to adopt? If it is possible to remove the tumor it should be removed, as the patient is in fairly good condition. On the other hand, the growth is extensive, it has lasted for five years, and he is seventy-two years of age. Surgical interference would demand the removal of the prostate, of practically the whole bladder, and the transplantation of the ureters into the abdominal wall, or superficially in the lumbar region. It seemed better in this case to make a suprapubic opening into the bladder, remove the fungoid growth and the exuberant mass of epithelium with the cautery, and then treat the affected area with radium. This plan of treatment is being carried out; the patient will receive three 50-milligram doses of radium applied for fifteen hours at intervals of a week, with the hope that it will at least end his cystitis and prolong his life, and possibly result in a cure.

The question as to the advisability of operation on the prostate, with the carcinoma so close to it and possibly arising from it, presents a difficult problem. It seems wiser, unless we are able to cure the carcinoma, not to remove the prostate, since at the present time there is no obstruction to the passage of urine. The patient's lowered kidney function, as evidenced by the excretion of only 45 per cent. of phenolsulphonephthalein in five hours, is another reason for being conservative as far as surgical intervention is concerned. If the ulceration improves

under treatment and an obstruction does occur, it may seem wise to remove the prostate later.

In the second patient we found a sessile fungating tumor mass, with a broad elevated base covered with calcareous deposit, just above and lateral to the right ureteral orifice. The base of the tumor was hard and indurated. The patient has an intense, diffuse, purulent cystitis. The urine is thick, stringy, and almost pure pus. There is an edema of the bladder mucosa. A small section of the tumor was removed through an operating cystoscope for diagnostic purposes. The hemorrhage in this case unquestionably came from the bladder. We shall treat it similarly to the first case, with repeated doses of radium applied through a suprapubic opening.

In the case of papilloma, if the growth does not appear to be sessile, we may assume that it is probably not yet malignant. Such growths should be fulgurated or removed by resection of the bladder. In case of doubt it is often wise to remove the papilloma completely with its base, and suture the bladder. Before this clinic three years ago I removed such a papilloma. On examination it was found to be an early carcinoma. The growth was so near the right ureteral orifice that the ureter had to be detached and transplanted into the fundus of the bladder. The patient made a satisfactory recovery. Two years later, while I was away during the war, my associate, Dr. Hammond, performed a nephrectomy because of a pyonephrosis that had developed in the kidney of the same side, due to a stenosis at the point where the ureter was attached to the fundus of the bladder. I mention this case because I am able to show this patient to you today without recurrence, and also because this case emphasizes the fact that transplantation of the ureters is not always followed by entirely satisfactory results.



CLINIC OF DR. EDWARD LOUIS MOORHEAD

MERCY HOSPITAL

CHRONIC ULCER OF LEG TREATED BY SKIN-GRAFTING

Summary: Patient presenting chronic ulcer of leg the result of pressure necrosis from a plaster cast. Healing by skin-grafting. Technic of skin-grafting; autogenous graft the material of choice; dressing of wound an important factor in obtaining a successful result.

SOME of you will remember having seen this young man at a previous clinic. Briefly, the history of the case is as follows:

He is a single American, thirty years of age, and a clerk by occupation. Two years ago in a street car accident he received an injury to the anterior tibial surface of the left leg. He states that he was taken to a hospital where a plaster cast was applied to the leg. This cast was allowed to remain on the leg for two months, during which time it was neither cut nor changed. Upon removal of the cast there was a large, sloughing ulcer on the anterior and lateral sides of the leg at the junction of the middle and lower thirds.

Why the cast was applied in the first place is a mystery, and why it was allowed to remain for so long a time is a still greater mystery. There was no fracture of the bones of the leg, at least no evidence of a former fracture can be demonstrated at this time. There was no radiographic examination of the leg made either primarily or at any subsequent time during his stay in that hospital. Can you imagine treatment such as this being given to an injury of this nature in this enlightened age? To begin with, if there were any question of fracture, it could have been easily proved or disproved by a radiographic examination. If there were no fracture, why the plaster cast? Again, if a circular plaster cast were applied to the leg, why was it not split

through the center, so that it could be removed and the injured limb examined from time to time? The resulting ulcer was due, no doubt, to a pressure necrosis the result of the plaster cast.

Following the removal of the cast he remained in the hospital for several weeks, and the ulcer was treated by the application of ointments and various dressings. Since leaving the hospital he has visited the different dispensaries, and previous to his admission to this hospital he had been dressing the ulcer at home.

He is a well-nourished young man, apparently in good health, and nothing is found in either his history or physical examination to account for the failure of the ulcer to heal, except that the area of destruction was too great for nature to overcome. However, he admits the probability of having contracted syphilis some years ago, although repeated Wassermann tests have given negative results. The Wassermann made since his admission to the hospital was negative. There are no varicose veins to account for the production or continuance of the ulcer.

At the time of his admission to the hospital the ulcer measured 4 inches in the vertical and 3 inches in the transverse diameter. The surface of the ulcer was covered with fairly healthy looking granulations, but the edges were hard, adherent to the underlying tissue, and immovable. The picture presented, therefore, was that of a large ulcer which nature had attempted to cover, but the defect was too great, so that it was necessary to supply the tissue for this purpose.

Today you see the result of the skin-grafting operation performed four weeks ago. The ulcer is entirely covered and healed, a most typical and fortunate result.

There are a few points regarding skin-grafting which are well worth remembering. For reasons not entirely clear, grafts taken from another individual, even a brother or sister, rarely do well, and never so well as those taken from the patient himself. It must be from some cause similar to that which produces hemolysis when blood from two individuals is mixed.

The skin from the anterior, outer, and inner surfaces of the thigh is commonly used for cutting grafts. The skin is prepared

the day before by careful scrubbing with green soap and water, shaving, and thorough douching with sterile salt solution. The limb is then enveloped in a dry sterile dressing, which is removed at the time of operation. The cleaner and more healthy the granulating surface, the better, and the greater the likelihood that the grafts will unite with the surface beneath and live. The granulating surface and the edges of the ulcer are cureted and all bleeding stopped by firm pressure with gauze packs before the grafts are applied. In this case the edges of the ulcer were dissected free from the underlying tissues to which they were firmly adherent.

The skin of the thigh is put on the stretch. The razor blade is held firmly at a slight angle to the skin and gradually advanced by a sawing motion, cutting the graft the desired length. During the cutting the blade of the razor and the skin are kept wet with salt solution, the assistant allowing it to dribble from wet pads of gauze. The blade and the graft curled up on it are then brought over to the raw surface to be covered and the graft is slid off the blade with a probe. Two probes are used to spread it evenly. The graft should slightly overlap the skin edge of the wound. Other grafts are then cut until the raw surface is fully covered. Any blood which may have collected beneath the grafts is carefully pressed out with wet pads of gauze. The whole area is then covered with strips of rubber tissue wet in salt solution, after which a firm dressing of dry sterile gauze is applied.

The dressing may be left in place five or six days or even longer, and if the grafting is completely successful the entire surface may be healed at the end of twelve days, after which a light boric acid ointment dressing may be applied for a week or two. The area from which the grafts are taken should be dressed in the same way as the grafted area. Some prefer dressing the grafted surface by exposure to the air under a cradle covered with gauze. This was the method used in this case.

MULTIPLE TUMORS OF THE THYROID

Summary: Multiple tumors of the thyroid present for thirty-two years with no symptomatology until recently; technic of removal; after-care of goiter cases.

THE patient, Mrs. V., an Austrian, aged fifty-three years, states that she has had a swelling in the region of the right lobe of the thyroid gland for the past thirty-two years. The swelling has been slowly increasing in size and now causes her great inconvenience when she attempts to swallow. She is very nervous and becomes tired upon the least exertion.

Her past history is negative. She is the mother of 4 children. One daughter, twenty-six years old, was recently operated upon for exophthalmic goiter. There is no history of tuberculosis or carcinoma in the family.

The patient is a fairly well-nourished woman. The scalp is negative. Pupils are equal and react to light. There is no exophthalmos. Teeth are in bad condition. There is a large tumor mass on the right side of the neck over the thyroid region, extending from the angle of the jaw to the clavicle (Fig. 336). Anteriorly and laterally it extends beyond the median line and covers the larynx. The upper portion of the tumor mass is very hard, while the lower portion is soft. The entire tumor mass moves on swallowing. There is no fluctuation or pulsation. Physical examination is otherwise negative.

Examination of a twenty-four-hour specimen of urine showed 950 c.c.; specific gravity 1024; acid reaction; no albumin, sugar, or casts.

Blood examination showed 4,328,000 red cells, 7000 leukocytes; coagulation time three and a half minutes. Blood-pressure was 135 systolic and 100 diastolic; pulse-rate 35.

The preoperative diagnosis was multiple tumors of the thyroid.

Operation.—Under ether anesthesia we are making the hockey-stick incision, the vertical arm of which is along the lateral margin of the tumor mass. The skin-flap with the platysma myoides is dissected upward and reflected to the left. The ribbon muscles are now retracted to the right, exposing the



Fig. 336.—*A*, The upper or hard tumor mass. *B*, Enlarged right lobe of thyroid.

surgical capsule of the gland. The capsule is incised in a vertical direction. The right lobe of the gland is large, soft, and very vascular. The superior thyroid vessels are now located, clamped, and ligated. By blunt dissection downward the gland is freed from the posterior wall of its capsule and the inferior

vessels are clamped and ligated. The isthmus is clamped, cut, and secured by an over-and-over suture, and the right lobe of the gland removed.

Up to this point the operation has been the usual one for the removal of the right lobe of the thyroid. However, this operation is far from completion. There remains the upper hard portion of the tumor mass, which is larger than the portion already removed, and which is more or less fixed, its posterior part apparently being firmly attached. There is a flat band of thyroid tissue extending from it to the upper portion of the isthmus. This band is ligated at the isthmus and reflected to the right. There is a question whether the removal of this hard tumor mass can be accomplished. The attachment to the larynx on the side and to the sheath of the carotid posteriorly may prevent its removal. While it is probably a tumor of the thyroid, its hardness and firm attachments cause one to think of a probable growth arising from the lateral surface of the larynx or from the deep cervical fascia. By careful dissection a line of cleavage is found and the tumor mass is gradually enucleated. Posteriorly, the attachment is quite firm, and as it is separated the sheath of the deep vessels of the neck is exposed. A few ligatures are applied to small bleeding points, making sure that there is complete hemostasis. Never close the wound of a goiter operation until you are satisfied that there is complete hemostasis. A small stab-wound is made in the center of neck, below the collar incision in the suprasternal space, and a small gutta-percha drain is introduced into the cavity left after the removal of the tumor mass. The surgical capsule is now closed by a fine continuous catgut suture. The muscles drop back in their place and the skin and superficial fascia are closed by a subcuticular catgut suture. The usual dressings are applied. The drain will be removed at the expiration of forty-eight hours.

As soon as the patient is out of the ether she will be propped up in bed with the aid of a back-rest. She will be given an abundance of fluids by mouth. By the end of a week the patient will be allowed to leave the bed. Frequently after goiter

operations patients complain of difficulty in expectorating accumulations of mucus, and it may be necessary to give an expectorant. For the first few days liquid diet will be given, after which the patient will gradually return to normal diet.

This case is of interest because of the slow growth of the tumor and the gradual production of pressure symptoms. There were two distinct tumor masses, one the soft, vascular right lobe of the thyroid, and the other the hard mass so firmly attached and apparently of thyroid origin.

After-history.—The postoperative course was uncomplicated. The patient was out of bed at the expiration of one week and returned to her home on the fifteenth day.

The pathologic report on the tumor masses is as follows:

Section of thyroid unsatisfactory on account of delayed fixation. However, areas of thyroid tissue can be made out. Stroma increased and hyalinized. Diagnosis: Adenoma of thyroid.

Examination of slide of hard tumor mass unsatisfactory, as practically entire tissue had undergone partial or complete autolysis due to fixation being postponed for several hours. Section shows parenchyma and connective tissue, both hydrolyzed. There is a suggestion of gland structure in isolated portions, but the section has undergone so many changes due to defective preparation that the nature of the tumor is not positive and a diagnosis would be hazardous. There are areas showing a distinct inflammatory reaction, probably consequent to degenerative changes in the tumor.

The measurements of the hard tumor mass were $11 \times 7 \times 4\frac{1}{2}$ cm., and of the soft tumor mass $8\frac{1}{2} \times 6 \times 1\frac{1}{2}$ cm.

CHRONIC DUODENAL ULCER: SLOW PERFORATION WITH FORMATION OF EXTENSIVE ADHESIONS TO GALL-BLADDER, LIVER, AND HEPATIC FLEXURE OF COLON

Summary: Chronic duodenal ulcer of ten years' duration. Operation reveals perforation on the anterior surface at junction of first and second portions. Closure of perforation. Indications for gastrojejunostomy in ulcer cases.

THE patient is a single American woman, fifty-eight years of age, by occupation a teacher. She states that she has been having bilious attacks twice a year for the past ten years. These attacks have varied in intensity. During the past three months she has had three attacks, the last one being very severe; the pain was excruciating for about one hour and caused the patient to double up. The pain started in the epigastrium and moved downward and to the right side, finally becoming generalized over the entire abdomen. These twice-yearly attacks came generally in the spring and fall. Previous to four years ago the patient states that she felt fairly well between the attacks.

In describing the attacks she says that the pain is always on the right side of the abdomen; at times it is high and again it is low on the right side. Occasionally there is a sharp pain across the abdomen in the region of the umbilicus. Frequently there is pain under the right shoulder-blade. There is always nausea and vomiting during the attacks. The vomitus contains a quantity of bile. Between the attacks there is a great deal of gastric distress, belching of gas, and distention or bloating after meals. She has been jaundiced, and at these times the stools were gray in color.

There is nothing of importance in her past history except an attack of inflammation of the bowels and erysipelas twenty-five years ago.

Menstruation began at eleven years, regular, five days' duration, and not attended by much discomfort. Menopause occurred at thirty-eight years.

The present attack began two weeks ago. The pain was at first very severe and was located high up on the right side of the abdomen, moving to the right and downward, and finally extending over the entire abdomen. There have been persistent nausea and vomiting. She is unable to retain anything in her stomach. Bowels are very much constipated.

Physical examination shows a poorly nourished woman, rather cachectic in appearance.

Chest: A few râles are heard over the upper part of both lungs.

Heart: There is a slight systolic murmur.

The abdomen is slightly distended and tympanitic. There is muscular rigidity present which is more marked on the right side. To the right of the median line and extending downward from the costal arch to the level of the umbilicus there is an area of extreme tenderness, the slightest pressure causing great pain. Tympany is decreased over this area.

Blood examination shows 4,253,000 red cells, 12,000 leukocytes, and 70 per cent. hemoglobin.

Examination of a twenty-four-hour specimen of urine shows 1150 c.c.; specific gravity 1015, reaction acid, no sugar, albumin, or casts; a few white blood-cells.

Chemical analysis of the gastric contents following an Ewald meal shows that 80 c.c. were recovered, with a total acidity of 100 and free HCl of 60. Occult blood was present. Repeated examinations of the stools reveal positive blood.

Fluoroscopic examination of the stomach shows the emulsion passing through the esophagus freely. The stomach is of the atonic type. The greater curvature reaches approximately 3 inches above the pubic arch. On manipulation, the stomach appears to be free and pliable. Peristaltic function is normal. The pylorus closes off squarely to the tip. The first and second portions of the duodenum show a number of filling defects which cannot be properly visualized. This condition is probably due to a chronic ulcer of the duodenum or a gall-bladder infection, producing either adhesions or cicatricial tissue.

A series of radiograms confirm the fluoroscopic findings.

The patient has been under observation in the hospital for the past week. Her temperature has varied from 98.6° to 100° F. To relieve the pain an ice-bag was applied to the abdomen and the patient given an occasional dose of morphin sulphate, grain $\frac{1}{4}$.

From the history, the physical findings, and the radiologist's report the tentative or preoperative diagnosis is a chronic duodenal ulcer with slow perforation, or a chronic cholecystitis with a resultant pericholecystitis and rather extensive adhesions of the surrounding structures. It is rather difficult to make a positive diagnosis in a case such as this, extending as it does over a long period of time, with intermissions during which the patient was apparently free from trouble. Analyzing the symptoms as given by the patient, one may easily ascribe them to gall-bladder disease. The pain in the upper right abdomen to the right of the median line and frequently radiating under the right shoulder-blade, coming on suddenly, followed by nausea and the vomiting of bile-stained material, and accompanied by jaundice and clay-colored stools, the gastric disturbance, belching of gas, and distention after meals—all point to gall-bladder disease. However, the present attack is somewhat different. The pain, very severe at first, was located high up on the right side of the abdomen, and then moved to the right and downward, finally extending over the entire abdomen. The pain remains general over the entire abdomen, but is more acute on the right side of the upper abdomen. There has been no cessation of the pain. There are persistent nausea and vomiting, muscular rigidity, and abdominal distention, indicating that there is an acute intra-abdominal condition which may have its origin in a slow perforating duodenal ulcer.

In the differential diagnosis acute appendicitis must be considered. Sometimes the appendix is located rather higher up on the right side than normal. It has been found attached under the liver and over toward the median line. However, a perforating appendicitis would have resulted by this time in general peritonitis and death, or in the formation of a large abscess, the escaping material from a perforating appendix being of a

more virulent character than that from a perforating duodenal ulcer. There is no indication of any large abscess formation, and I am inclined to believe that the peritonitis is circumscribed, being confined to the right upper abdomen in the region of the gall-bladder and duodenum.

What is the proper treatment for this patient now? Surely the time for temporizing has past. There was a time when this patient should have received proper medical and dietetic treatment, and if the underlying cause of her present condition is a slowly perforating duodenal ulcer, a cure no doubt would have been obtained. The treatment of gastric and duodenal ulcer is primarily medical, and it is only when that has failed that the case becomes surgical. The exception, of course, is in cases of hemorrhage or perforation where operation is imperative. Other surgical indications are rest for the duodenum and relief of obstructive symptoms, if such exist, which can be best accomplished by posterior gastrojejunostomy; separation of adhesions which may be interfering with the function of the biliary passages, pylorus, or duodenum; excision of the ulcer, if suitably placed; threatened perforation.

Operation has been advised in this case on the basis of the tentative diagnosis.

Under ether anesthesia I am making an incision over the inner border of the right rectus muscle, from about 1 inch below the ensiform cartilage almost to the level of the umbilicus. The skin and subcutaneous tissues are now retracted and the anterior wall of the rectus sheath is divided. The rectus muscle is then separated from its sheath. It is easily separated from the posterior portion of its sheath by blunt dissection, but the anterior portion presents some difficulty at the insertion of the lineæ transversæ, one of which is found about midway between the ensiform cartilage and umbilicus and is crossed by this incision. The attachment of the muscle to the anterior wall of its sheath is very close at this linea transversa, and requires sharp dissection with knife or scissors. When the muscle is thoroughly freed from its sheath, except at its outer border, it is easily retracted outward, and allows the posterior wall of its

sheath and the peritoneum to be incised in the same direction as the skin and anterior wall of its sheath.

On opening the abdomen a very complex picture presents itself. The various structures, the liver, gall-bladder, duodenum, colon, and omentum are all adherent and matted together, giving evidence of a more or less extensive peritonitis (Fig. 337, 1). Great care must be exercised in freeing these adhesions. The omentum is gently separated from the lower border of the liver and the colon, thus exposing the gall-bladder. The gall-bladder is firmly fixed and it is with great difficulty that it is freed from the surrounding adhesions. There is a slight escape of fluid as the omentum is separated, indicating that there is a perforation of the duodenum. The liver is retracted upward and outward by a broad retractor. The colon is held downward by a laparotomy pad and the stomach is held toward the median line by another pad. Other pads are placed in such positions as to protect any further invasion of the peritoneal cavity. The duodenum is freed from adhesions, for if this is not done great difficulty will be found in closing the perforation.

The perforation of the duodenum is found on the anterior surface at the junction of the first and second portions (Fig. 337, 2). The edges of the perforation are freshened and closure is made by a purse-string suture reinforced by a few Lembert sutures (Fig. 337, 3). Fortunately, the induration surrounding the ulcer is not of such a degree as to prevent closure in this manner. In some cases the induration of the edges of the ulcer is of such a character that the sutures will not hold, and it may be necessary to excise a diamond-shaped section of the duodenum, including the ulcerated area, and suture the wound transversely to the long axis of the gut. In closing a perforation the sutures should be so placed as to avoid narrowing the gut as much as possible. Two lines of sutures should be employed so as to infold the perforation. Direct suture of the edges of the perforation will usually fail. The first layer of sutures should be placed at a slight distance from the edge of the perforation and the second layer still further away. Many times this will

result in a decided narrowing of the duodenum. The suture line is further strengthened by bringing up a piece of omentum and attaching it over the suture line. There is marked evidence of



Fig. 337.—1, Condition found upon opening the abdomen, showing extensive adhesions, the result of the perforation of the duodenum. 2, Perforation of duodenum; purse-string suture introduced. 3, Purse-string suture tied and Lembert sutures introduced.

cholecystitis in this case, and while one is tempted to remove the gall-bladder, perhaps under the circumstances drainage is the best procedure. A small rubber tube is introduced into the

gall-bladder by the usual method of invagination and a small cigarette drain is placed alongside the tube, down to the neighborhood of the suture line of the perforation, but not in contact with it. This cigarette drain will be removed at the end of forty-eight to seventy-two hours.

As to the necessity of gastrojejunostomy being performed at the time of closure of the perforation, this should not be done as a routine. If the closure of the perforation produces a marked narrowing of the duodenum, then gastrojejunostomy is a necessity. If the closure and subsequent healing of the ulcer are apt to result later in marked narrowing of the duodenum, if the operation is performed early before peritonitis has occurred, and if the patient's condition remains good, gastrojejunostomy may be done at the primary operation; otherwise it increases the danger to such a degree that it is best postponed to a later time. In the present case the duodenum has not been narrowed to such a degree as to indicate a gastrojejunostomy.

The laparotomy pads are all removed, there has been no soiling of the peritoneum, and gentle sponging with a warm moist pad completes the toilet of the peritoneum. The abdominal wound is closed layer by layer in the usual manner and a large gauze dressing applied. The drainage-tube in the gall-bladder is coupled by a glass elbow to a rubber tube which drains into a receptacle attached to the side of the bed.

The after-treatment consists in keeping the stomach empty for a few days. Nutrient enemata will be employed to sustain the nutrition of the patient, and solutions of 5 per cent. glucose and 2 per cent. bicarbonate of soda will be used to maintain the fluid content of the body.

Postscript.—The patient made an uneventful recovery, and returned to her home at the expiration of four weeks with the wound completely healed. A recent communication from her states that she has gained in weight, has a good appetite, and has had no return of her former complaint.

CLINIC OF DR. GEORGE E. SHAMBAUGH

PRESBYTERIAN HOSPITAL

BILATERAL DESTRUCTION OF THE LABYRINTH AS A SEQUEL OF CHRONIC SUPPURATIVE OTITIS MEDIA

Summary: Diagnosis. Loss of sense of motion as a result of labyrinthine destruction. Changes in voice characteristic of various types of deafness. Characteristics of the most dangerous form of chronic suppurative otitis media. Technic of operation for diffuse suppurative labyrinthitis.

THE patient, a man aged fifty-three, consulted me October 20, 1919. He had been aware of a slight discharge from both ears since childhood. He had always felt that his hearing was rather acute, and since he had no symptoms from the ears except a slight moisture he had never taken the ear situation seriously, occasionally seeing a doctor and having the ears cleansed. Last April he had a slight operation in the right ear, which, from his description, consisted of snaring out an aural polyp. This was done under local anesthesia at the doctor's office, and caused no unpleasant reaction. Three days later he developed intense vertigo, with tinnitus and loss of hearing in the operated ear. The vertigo was so intense and prolonged that he was confined to his bed for over ten days. Since that time he has not been able to hear in this ear. As he was able to hear very well in the left ear, he was not seriously handicapped because of the destruction of the right.

Ten days before consulting me he noticed a little blood-tinged discharge from the left ear, when he again consulted his physician, who gave him an "oily" preparation to use in this ear; probably carbolized glycerin. Very shortly after the first application, but probably not caused by the application, he

developed severe tinnitus and disappearance of hearing in this ear. This happened early in the forenoon. He relates that several hours later, while taking dinner with some friends in the woods, he experienced a momentary vertigo, followed by no unusual disturbances during the rest of the day, as he walked about the woods with no more difficulty than ever. On getting up the next morning, however, he found that his equilibrium was very much disturbed. He did not experience genuine vertigo, such as was present subsequent to the trouble in the right ear, but he found that his gait was rather unsteady and that he would sway from one side to the other. This unsteadiness of his equilibrium has steadily improved. His one symptom, besides the unsteadiness of equilibrium and the loss of hearing, was the persistence of an occasional metallic ringing, which developed in the left ear, lasting only momentarily.

Examination disclosed in the right ear a perforation in the upper posterior quadrant of the membrana tympani; the remainder of the drum was intact. There was still a small amount of offensive discharge coming from the aditus. In the left ear there was a similar situation. In neither ear was there enough discharge to be perceptible, except on introducing a small pledget of cotton into the opening in the drum membrane.

The patient had a peculiar rasping, high-pitched voice, which, his attendant informed me, had not been present before the loss of hearing in the left ear.

In testing the patient's hearing we found absolutely no vestige of hearing for any part of the tone scale, either for air or for bone conduction. The large tuning-fork, such as the "A" (Bezold), was perceived as a jarring, but not as a tone. An examination of the semicircular canals by rotation tests elicited no sensations of vertigo and no nystagmus. Romberg gave a positive response. With the eyes closed the patient swayed, but still was able to stand in the same spot. Attempting to stand on one foot, however, with the eyes closed, the patient fell over immediately, and would have fallen to the ground if he had not been supported. This was repeated a number of times, and each time we got the same response. A patient with the labyrinth

destroyed on both sides has no sense of motion and, with his eyes closed, will fall without appreciating just what is happening.

A word of explanation might be said regarding the character of this man's voice. Very often a diagnosis can be made of the location of the ear trouble from the character of the voice. A patient who has a marked degree of deafness which is due to obstruction in the sound-conducting mechanism is very likely to have increased bone conduction. This is especially true of cases where there is bony fixation of the stapes, and in these cases the patient hears his own voice much more clearly than does a normal hearing person. The result is that he pitches his voice so low that we experience difficulty in hearing what he says. Patients who have ordinary labyrinthine deafness of a moderate degree show no alteration whatever in the voice, for the reason that the nerve deafness, until it becomes very extensive, involves the upper part of the tone scale, which is scarcely used at all in conversation tones. On the other hand, where there is total destruction of the function of hearing, if this involves both sides, the patient's voice undergoes a very marked alteration, due to the fact that he does not hear his own voice. This alteration, as a rule, renders the voice louder, harsher, and usually higher pitched than normal. It is not an uncommon experience to observe in a patient who has progressive otosclerosis the characteristic low voice which is present for a great many years, but which finally changes over to the loud rasping metallic voice, the change being due to the fact that as the disease progresses it finally results in destruction of the function of the internal ear.

In this case there is no question about the conclusion that the patient has suffered total destruction of function, first in right ear last April and now in the left ear. The onset in both cases was sudden, so we cannot attribute the labyrinth trouble to those degenerative changes which so frequently occur in the internal ear, secondary to long-standing middle-ear disease. In both ears we find unmistakable evidences of the type of chronic suppurative otitis media, associated with osteitis. This diagnosis is based, first, on the character of the perforation, occupying as it does the upper posterior quadrant, located in the margin of

the drum membrane, with erosion of the bony attachment of the membrane; and in the second place, the diagnosis is made from the character of the discharge. The amount of the discharge is not significant. Quite frequently the most dangerous form of chronic suppurative otitis media is in cases where the discharge is so slight that the patient is not aware of there being any moisture. The character of the discharge which is significant is the absence of mucus and the presence of an offensive penetrating odor, which is caused by the disease of the bone. The usual type of a chronic running ear is the simple type, where the disease is restricted to the mucous membrane lining the middle-ear chambers. This is a disease which is not a distinct menace to the individual even in cases where the discharge may be quite profuse.

We have in this case, then, distinct evidences of a bone-involving process which we have long since learned to recognize as a condition which is likely to lead to serious complications, such as sinus thrombosis, meningitis, brain abscess, and, as in this case, invasion of the internal ear. When there is extension to the labyrinth of the ear, the disturbance which is set up may be the result of a mild diffuse labyrinthitis, which results only in partial suppression of labyrinth function. These mild cases usually recover the function of the labyrinth. We term this condition serous labyrinthitis. The more severe cases result in total permanent destruction of the function of the internal ear, not only the function of hearing but also the function of the semicircular canals. In these cases there exists diffuse suppurative labyrinthitis. Diffuse suppurative labyrinthitis may be a distinct danger to the patient, as it may result in an intracranial extension, especially along the route of the internal meatus. This results either in meningitis of the posterior brain fossa or cerebellar abscess located near the orifice of the internal meatus. In cases where there has been diffuse labyrinthitis destroying the entire function of the internal ear, if symptoms of headache or other evidences of intracranial irritation arise, one should subject the case to a radical mastoid operation, followed by free drainage of the labyrinth. The operation upon the labyrinth is carried out

by chiseling away the promontory which is formed from the first turn of the cochlea. The chiseling is begun just below the lower edge of the oval window. Following this the horizontal semi-circular canal, where it forms a prominence in the floor of the aditus, is chiseled away and the anterior crus is followed until it opens into the vestibule. The opening in the labyrinth is, therefore, made in front and behind the ridge for the facial nerve. A complete exenteration of the labyrinth has been recommended, but adds little, if anything, more to the safety of the patient than the operation establishing free drainage.

IMPAIRMENT OF HEARING DUE TO FRACTURE AT BASE OF SKULL

Summary: Methods of examination to determine unilateral deafness. The Dennert control. Objections to the use of a noise apparatus. Rotation and caloric tests to determine functional capacity of semicircular canals

THE patient, a man fifty-one years of age, consulted me October 6th because of defective hearing in the left ear, which dated from an injury which he received last April. In attempting to escape from an automobile, when crossing the street, he fell against the curb, striking the back of his head. He states he was unconscious for about twenty-four hours; that on awakening he noticed severe tinnitus in the left ear, and that he was hard of hearing on that side. He was kept in bed for three weeks, with a diagnosis of an intracranial clot as the result of injury. He gives an indefinite history of sensations of vertigo while still in bed, but when he got up three weeks after injury he was annoyed very much from disturbance of equilibrium, and this annoyance still persists six months after injury, although it is not troubling him so much. He is chiefly anxious about his hearing and fears that the trouble may extend to the opposite ear.

Examination discloses practically normal drum membranes. Hearing for the voice in right ear is normal. No hearing in the left ear, for with the right ear closed the voice is heard just as clearly with the left ear closed as when it is left open. This method of examination is known as the Dennert control, and is a satisfactory method for determining whether a patient has any hearing for the voice. It is not applicable for the higher tuning-forks or Galton whistle, because these are heard so readily through bone conduction. The "C" fork, vibrating 64 times to the second, was heard normally in the right ear, but not heard in the left. The "A" tuning-fork was also not heard in the left, but was normal in the right. The "c⁴," a high-pitched fork,

was heard normally in the right, but was not heard in the left. In examining the hearing with this fork one was not able to exclude the opposite ear by closing the meatus. It is possible, however, to determine whether the patient has any hearing for the "c⁴" fork in the affected ear. This is done by first closing the opposite ear. The "c⁴" is then sounded loudly and held about 5 inches above the defective ear until the patient ceases to hear it. Then it is brought quickly before the external meatus of the affected ear. If the patient begins to hear this fork when held before the meatus, after he had ceased hearing it when held 5 inches above the ear, it is quite evident that the perception takes place in the ear examined and not in the opposite ear.

A valuable test in determining one-sided deafness is carried out by using the "a¹" tuning-fork. This fork sounds rather loudly, and yet, with the finger in the opposite ear, there is no hearing for this fork in cases where the labyrinth is destroyed. Should the patient hear the "a¹" fork at all, it is evident that there is not a total defect in hearing in the ear being tested. As a matter of fact, the higher one goes in the tone scale the more difficult it is to exclude the opposite ear, for the reason that the higher tones are less dependent upon the sound-conducting mechanism for transmission to the labyrinth, but the perception takes place more readily through bone conduction.

In examining this case with the Galton whistle we found that the hearing in the right ear was normal, whereas in the affected ear the only part of the scale which was not heard when the whistle was sounded before this ear, with the opposite ear closed, was the stretch above 7. This does not mean that the patient heard the remainder of the whistle in the affected ear; it simply means that the other notes of the whistle could not be excluded from the opposite ear.

A satisfactory way of excluding the opposite ear in testing for one-sided deafness is by producing a noise in the normal ear. Special apparatuses are devised for this purpose. There is one objection to their use that is very apparent, and that is this: where the margin of hearing in the ear being tested is very low, a noise apparatus applied to the normal opposite ear will prevent

the perception for this remnant of hearing in the ear being tested. One who is experienced in testing ears has little difficulty in establishing a diagnosis of unilateral deafness without the use of a noise apparatus.

In determining whether there has been a complete destruction of function in the labyrinth in a case like the one here demonstrated, it is necessary to test the vestibular mechanism. This is done by stimulating the semicircular canals either by rotation or by caloric stimulation. In this case the nystagmus resulting from rotating the patient to the right was very weak and lasted but nine seconds, whereas on rotating the patient to the left the nystagmus was more vigorous and lasted twenty-seven seconds. In making the rotation test one cannot test each ear separately, and yet we know that the most of the response which is obtained after rotation to the right results from stimulation of the left ear, and vice versa. Where there is total destruction of function in one ear, we find, as a rule, just about the difference in the duration of the nystagmus which we found in this case.

In order to test each ear separately one has to employ caloric stimulation. In this case cold water syringed into the left ear for several minutes gave absolutely no response.

The diagnosis is total destruction of function for the labyrinth on the left side, caused by a fracture at the base of the skull, passing through the petrous portion of the temporal bone. It is apparent from this discussion that the diagnosis based upon the symptoms and the functional tests is not a simple matter.

CEREBRAL NERVE DEAFNESS

Summary: Deafness following an attack of influenza. Diagnosis. Differentiation of internal ear and cerebral nerve disease.

THE deafness in this case occurred in a woman aged thirty-six, and developed in the latter part of March, 1918, during an acute infection of the respiratory tract, which lasted less than a week. As her husband was ill with influenza at the time, her illness was attributed to the same cause, although she was not sick enough to be kept in bed. She did not seem to be able to make a complete recovery, but continued in a state of fatigue and exhaustion, often remaining in bed for the entire day, rarely being up more than a couple of hours a day. She slept most of the time. Had no complaint about headache. Five weeks after onset of illness she began to notice loss of hearing, associated with severe head noises; no vertigo. Two weeks after onset of ear symptoms she was totally deaf, as far as ability to hear the voice was concerned.

The patient was seen by me October 8, 1919. She complained of deafness, tinnitus, and lack of energy, which had kept her in bed part of each day since the onset of her trouble. At no time has there been any vertigo. Her husband states that on several occasions, on waking up in the morning, she seemed to be temporarily dazed, attributing noises in the head to the breaking of windowpanes in the house; at other times to the explosions of bombs, which she said returning soldiers were dropping about the house.

Examination of the ears disclosed no evidence of middle-ear trouble. The patient was not able to hear the spoken voice. The "C" fork, vibrating 64 times to the second, was not heard in either ear. "A" fork was heard, both by bone and air conduction, in both ears indistinctly. In a fork of this type it is not difficult to confuse a jarring sensation with the perception of tone; "a¹" fork was not heard in either ear by either bone or

air conduction; "c⁴," vibration 2048 times a second, was heard in both ears very faintly. The Galton whistle was heard practically throughout its entire extent, but always very indistinctly.

No middle-ear process, not even complete bony fixation of the stapes, which is not associated with degenerative process in the inner ear, can ever produce anything more than a moderate depression of hearing function. Severe deafness always means defect in the nerve mechanism, which may be secondary degeneration of the eighth nerve, a condition which frequently follows long-standing middle-ear disease.

The absence of vertigo does not exclude the possibility of a degenerative process involving the vestibular mechanism, although in a case where the degeneration in the labyrinth has advanced so rapidly as in this case, if the vestibular mechanism is involved simultaneously with the cochlear apparatus, vertigo is to be expected. Where a degenerative process develops slowly, it is possible for it to go on to a point of complete suppression of the function of the semicircular canals without at any time giving rise to the symptom of vertigo.

Examination of the vestibular part of the labyrinth in this case showed that it responded normally to stimuli. This test was carried out by turning the patient in a rotating chair, with the head fixed in the upright position. It was found on rotating the patient ten times to the right that on stopping rotation a very vigorous horizontal nystagmus developed, which lasted over twenty seconds, and a similar response was elicited by rotating the patient to the left.

The diagnosis of nerve deafness is very easily made in a case of this sort. The determination of the location of the deafness is quite another matter, as this may be due to changes in the internal ear or changes in the central nerve tracts in the brain. Where a patient develops, as the result of an acute infection, depression of hearing due to changes in the internal ear, the changes here are in the nature of labyrinthitis, and where the function is not completely destroyed we would term the process in the labyrinth "serous labyrinthitis." Serous labyrinthitis is likely to be unilateral, and at the same time it is hardly to be

imagined that such a process would not involve the entire labyrinth, that is, the cochlea as well as the semicircular canals. In this case the involvement was bilateral and involved only the hearing part, so that we can reasonably exclude the labyrinth itself as the seat of the trouble.

The conclusion we reach here is that the defect in the hearing is due to involvement of the cerebral centers of hearing, which are quite apart from the centers for the vestibular nerves. An analysis of the patient's general symptoms would warrant the diagnosis that she had suffered from a form of encephalitis which had produced bilateral paralysis of the cochlear nerve. The duration of the defect, lasting six months, would seem to exclude the probability of a recovery.

AURAL VERTIGO DUE TO DEGENERATION OF VESTIBULAR NERVE WITHOUT INVOLVEMENT OF COCHLEA

Summary: Vertigo always an aural symptom with or without involvement of hearing. Value of checking the rotating with the caloric tests in study of function of semicircular canals. Basis for diagnosis in present case.

BEFORE the writings of Ménière, which appeared in 1861, the symptom of vertigo was always attributed to intracranial disease, and when Flourens published the results of his experiments in operating on the semicircular canals of pigeons and recorded the phenomena of vertigo, physiologists were inclined to explain the symptoms he had observed as the result either of traumatism to the brain while doing the operation or to the subjective noises which they assumed would result from the traumatic injury of the sound-perceiving mechanism of the internal ear. Vertigo is now recognized as always an aural symptom, in the sense that it is always due to some disturbance of the vestibular mechanism, just as tinnitus aurium is always an aural symptom the result of disturbance of the cochlear mechanism. In either case this disturbance may be due to disease located in the labyrinth itself or to some central interference with the intracranial pathway of the eighth nerve. In a general way we expect to find vertigo which results from disease of the peripheral mechanism associated with an involvement of the hearing. This is also true of lesions located in the cerebellar pontine angle, where both the cochlear and vestibular nerves are found combined in forming the eighth nerve. A disease beginning in this locality may for a considerable period produce symptoms of disturbance of either the cochlear or vestibular nerves separately. It is rather characteristic of vertigo caused by intracranial disturbance that the hearing is not involved.

In the case which I am here demonstrating the conclusion which I have reached after completing the examination is that the vertigo is due to disease in the peripheral mechanism, that is, in the labyrinth, although we find no evidences of involvement of the cochlea.

The patient is a woman aged thirty-seven, who consulted me October 17, 1919, giving a history of no general constitutional disease. Her general health has been good. She had her first attack of vertigo, which came on in the middle of the night, the end of November, 1918. The attack was not associated with tinnitus aurium nor with a defect in hearing. There was nystagmus and nausea and vomiting. She recovered from the attack in less than a week's time. Was confined to her bed only three days. The next attack developed in January, 1919, coming on again in the middle of the night, and was not associated with any disturbances of hearing. This attack was more severe than the first and she was kept in bed, because of the vertigo, for two weeks. There was intense nausea and vomiting during the first days and a violent nystagmus, although I could not gather whether the nystagmus was directed to the right or toward the left. Since then the patient has had milder attacks and still feels somewhat uncertain as regards equilibrium.

On examining the patient I found a central perforation about 2 mm. in diameter in the right drum membrane. The ear, however, was quite dry, and the patient states that the perforation was the result of an injury inflicted while digging in her ear with a hairpin eighteen years ago. She had never experienced any discharge. The left drum membrane was normal. The functional tests showed only a very slight depression of hearing for the whispered voice. The Weber was lateralized to the right and the Rinné in the right ear was negative, but positive in the left. Testing the various parts of the tone scale disclosed a moderate defect restricted to the lower part of the tone scale. The higher notes were heard normally. The hearing in the left ear was entirely normal.

The patient was the wife of a physician, who was aware that there was a perforation in her right drum membrane, and naturally was inclined to attribute the attacks of vertigo to some disturbances resulting from this perforation in the right ear.

In testing the vestibular mechanism we found that there was no spontaneous nystagmus. Spontaneous pointing was also normal for both arms. In rotating the patient to the right

she developed a weak horizontal nystagmus to the left, which lasted only nine to ten seconds. After rotating the patient to the left there developed a much more vigorous horizontal nystagmus to the right, which lasted fully twenty-three seconds. The pointing tests after rotation showed the normal past-pointing when the patient was rotated to the left, that is, for both the left and right hands the patient past-pointed to the left from 4 to 6 inches. After rotation to the right the patient still past-pointed, but, as might be expected where the resulting nystagmus was so slight, she past-pointed only about 4 or 5 inches for the right hand and not more than 2 inches for the left.

It is not uncommon to discover that the responses from stimulation of the horizontal canals may be normal, whereas the caloric stimulation of the superior canals may fail to give a response. For this reason I thought it best to complete the examination by making the caloric test. In applying this test in a case where there is a perforation of the drum membrane one must avoid the use of cold water, as this is very likely to bring on an acute suppurative otitis media. A normal caloric response was obtained in this patient's right ear by allowing compressed air to be driven into the external meatus. There developed in less than a minute's time a rotary nystagmus, with the quick component directed to the left. In the left ear we resorted to the usual method of irrigation with cold water. To try to get a caloric response by injecting cold air into the external canal with the drum membrane intact would be a very tedious procedure. The injection of cold water into the left ear in this case developed a rotary nystagmus directed to the right, but the nystagmus came on rather slowly, taking fully two minutes before it began to appear.

The conclusion which I have reached in this case is that the patient has a degenerative process involving the vestibular apparatus, apparently only in the left ear.

Where an intracranial lesion is causing vertigo we are very likely to get abnormal pointing reactions after stimulation of the semicircular canals.

CLINIC OF DR. EDWARD LYMAN CORNELL

CHICAGO LYING-IN HOSPITAL

CESAREAN SECTION FOR PLACENTA PRÆVIA

Summary: The proper handling of a case of placenta prævia in order to have a living child. Technic of classical cesarean section. Varieties of placenta prævia—advantages of blood transfusion in these cases.

SOME of you will recall that this patient entered the hospital March 28th about midnight. She is a Jewish woman, thirty-one years old, gravida II. Menses began at fourteen years of age. They have always been regular, twenty-eight-day type, of three days' duration, with slight pain. Her last menstrual period was September 14th. She felt the baby January 30th. Her last pregnancy, two and a half years ago, resulted in miscarriage at four months. At that time she was not under my care and no effort was made to determine the cause of the miscarriage. The Wassermann test made on her blood is negative. On March 28th she went down town about noon, shopped around, had dinner with her husband in the evening, and went to the theater. On the way home she noticed some bleeding, which became worse when she went to the toilet. She called me up and I sent her into the hospital. She was not having pain. Two small blood-clots were passed and there were no uterine contractions. She was given $\frac{1}{4}$ grain of morphin and put to bed. The bleeding subsided the next day, but she was kept in bed for five days.

She was allowed up in the chair on the sixth day, and remained up for three days, when she started to bleed again and passed another rather large blood-clot. She had no pain and no uterine contractions. An ice-bag was placed on the lower abdomen. She was then kept in bed continuously until May

1st. Since admission to the hospital she has had one dose of coagulose on April 12th and 10 c.c. of normal horse-serum on April 20th. On the 20th she complained of pain in the abdomen, and a fair amount of bright red blood with some clots was passed. On the 21st the discharge stopped to some extent, and by the 22d there was a small amount of dark bloody fluid. From that time until May 1st there was no blood seen. She was allowed to get up on May 1st for a half-hour in the morning. On May 2d about midnight she had considerable bleeding, and complained of pain in the lower abdomen and back. Morphin was given at 4 o'clock in the morning and the patient was relieved. At 11 A. M. uterine contractions were felt on an average of every five minutes, but the patient was not complaining of any pain. The patient was watched until 3.30 this afternoon, when it was decided to perform a cesarean section, the reason being that the patient was in labor and bleeding quite badly.

From her menstrual period date this patient is due June 21st and from the quickening date she is due June 21st. Many of you will ask, perhaps, why we should do a cesarean section on a premature infant where there is so little chance of its living. Is this cesarean section done in the interest of the mother or in the interest of the fetus? I estimate that this child will weigh between 4 and $4\frac{1}{2}$ pounds. The fetal heart tones are good in quality and regular. This patient is extremely anxious for a baby. She has never carried a child to term, so that the cervix has never been fully dilated. No vaginal examinations have been made, but on rectal we find the cervix is soft, effaced, and dilated about one finger. Over the cervix there is a peculiar sensation, and earlier this afternoon following rectal examination the patient bled considerably, so there is no question in my mind but that it is a placenta prævia, probably of the lateral type. We do not get the uterine souffle in the anterior portion of the uterus and, therefore, I rather suspect that the placenta is located on the posterior wall. This, however, does not necessarily follow, as the location of the uterine souffle is not an accurate guide as to the location of the placenta. If we deliver from below we have the risk of severe postpartum hemor-

rhage and the added risk of losing the child due to the interference with the fetal circulation, and also to the trauma to the child which goes with uterine contractions. I fully appreciate that there is a certain risk to the mother attending cesarean section, but this patient has been in the hospital for over a month, has had no vaginal examinations, and has never had a rise in temperature. Therefore the risk to the child is less from above than in labor from below. I feel we are justified in doing a cesarean section, especially in view of the fact that this patient is willing to undergo anything in order to get a live baby. My original plan in this case was to carry her along, providing she had no uterine contractions and, if necessary, to replace the volume of blood lost by blood transfusion. With this idea in view, I had her and her husband's blood typed, and found them compatible. We have been in constant touch with him, so that we could transfuse the patient within a very short time. I have never tried this plan as yet. It was suggested to me by Dr. De Lee and, theoretically, I can see no serious objection. We might thus be able to tide one of these placenta prævias over, at least until such time as the fetus is viable. We have prolonged this case for over a month and have a better opportunity to get a living child than if we had interfered when she first came in. As it is a case of placenta prævia, we shall do a classical cesarean section.

Under ether anesthesia I am making an incision beginning about 6 cm. above the umbilicus and carrying it around to the left and about 5 cm. below. You notice that as soon as the peritoneum is opened we have a uterine contraction which causes the uterus to stand up in the abdomen. We will wait until the contraction is over and, in the meantime, pack the intestines off with this rubber-dam laparotomy pad. This prevents the intestine from appearing in the wound and also keeps the liquor amnii, blood, etc., from the abdomen. It has an advantage over gauze pads in that there is very little trauma. The rubber does not become adherent to the intestines. The uterine contraction is now over and we will make an incision in the musculature about 4 cm. below the fundus. The child is

readily extricated and breathes almost immediately. The assistant is clamping the cord with two clamps and will cut between. As the baby is in good condition it is passed to the assistant and we will proceed with the operation; 1 c.c. of pituitrin is injected directly into the uterine muscles, half on one side of the incision and half on the other. She is also given 1 c.c. of pituitrin subcutaneously and 1 c.c. of ergot. There is no particular rush about the removal of the placenta. You will note that it is located on the posterior wall of the right side of the uterus. If you look in carefully, you can see that the cervix is well covered by the placenta and it is a placenta prævia lateralis. The uterine contractions now force the placenta away from the wall, and as there is very little bleeding from the wound we will wait until the next contraction before attempting to remove the placenta from the uterus. In the meantime there will be a certain amount of blood passed between the placenta and the uterine wall, helping to separate them. Considerable care should be exercised in removing this placenta so as not to produce trauma. We lift it up gradually, taking care that we remove the membrane entirely. I do not want to examine this placenta at the present time because the probabilities are that this surface over the cervix contains bacteria which may prove infective to the wound. By inspection from above we see that the uterine cavity is free of cotyledons. We note that the uterus is now well contracted, so that we will start sewing up.

It is important, in sewing up classical cesarean sections, that the apposition be accurate. We have three layers of muscle in this portion of the uterus. They have the power of contracting in different lines of direction, so that, if the musculature is not well sewed, in the course of involution muscular contraction is liable to cause a separation and you get a seepage of uterine material into the wound and perhaps into the peritoneal cavity, causing an infection. Aside from that, the uterine scar will not be in good condition, and in subsequent pregnancies you are liable to have a rupture. The first suture is of single No. 2, twenty-day, chromicized catgut. We start at the lower end of the wound and tie a single knot, including

in our continuous suture only the uterine mucosa, being careful not to insert the catgut in the uterine cavity. After reaching the upper end we retrace our steps, gathering in the first layer of the muscular fibers. When we reach the lower end of the wound we tie a knot to the end of the suture already there. This makes two rows of suture. Another suture is then started in the next layer of muscle at the upper end of the wound and a single knot tied as before. A continuous stitch is used, and when the lower end of the wound is reached the suture is carried through to the peritoneum. The suturing is then continued on the peritoneal surface of the uterus and carried up to the upper end of the wound, where it is tied in such a manner that the knot is buried. This makes four layers of sutures. Now, as a precautionary measure, we insert four to six interrupted catgut sutures, taking rather deep bites. In this case we will use five. We will now remove the rubber-dam, and you note that none of the intestines can be seen. The omentum is placed over the uterine incision and the abdominal wall is closed in the usual manner. I want to call your attention to the plastic work we are doing on the navel. If the navel is not sutured carefully we are apt to get some infection or the accumulation of secretion, with a more or less marked deformity resulting. As the patient only sees the scar, I feel that the cosmetic effect is important. It is really surprising how often the laity judge a surgeon by the condition of the scar.

The patient is in good condition, pulse 108, respirations 24, and color good. We will now examine the placenta. We find on the left side an area dark in color, having somewhat of an odor. This is a blood-clot. We also find somewhat higher up evidence of an organized blood-clot with beginning fibrous degeneration, so that our diagnosis has been confirmed both from the operation and from the appearance of the placenta. The nurse has weighed the baby and tells us that it weighs 4 pounds, 8½ ounces. It has a fairly vigorous cry. The air passages are clear and it is well formed.

I would like to take this opportunity to discuss with you the subject of placenta prævia. We divide this condition into

three groups: first, the *marginal* type, in which just the edge of the placenta is over the internal os; second, the *central* type, in which the center of the placenta lies over the internal os; third, the *lateral* type, in which that portion of the placenta between the margins and the center lies over the internal os.

The etiology of placenta prævia is somewhat obscure. It is generally believed that the low insertion of the ovum is a factor. Another theory is that the placenta develops in the reflex portion of decidua and then comes to lie over the internal os of the cervix. The predisposing factors are endometritis, subinvolution of the uterus, multiple pregnancy, and numerous pregnancies. In most of these cases, if one questions the patient, a history will be obtained of accidental abortion or of some inflammation of the genito-urinary tract. Many times the inflammation is mild and the patients do not suffer a great deal of annoyance.

The symptoms in this condition are quite characteristic. The first sign is hemorrhage, varying in quantity from a blood-stained mucus to a flooding. This hemorrhage comes on without pain and apparently without cause. It is usually seen in the last three months of pregnancy, although it may occur earlier. Doubtless many abortions are due to this cause, especially those in which there is considerable bleeding. The possible connection between abortion and placenta prævia is frequently overlooked. The hemorrhage may stop on placing the patient in bed or it may continue. It usually stops only to recur at a later date, often within two weeks. The second bleeding is more severe than the first, and with it may come labor-pains. Occasionally, however, the second bleeding will stop and a third attack will come on in a week or ten days. This last attack is most certain to be accompanied by labor-pains and considerably more bleeding. These symptoms are practically constant in every case.

The loss of blood results in a secondary anemia, the severity of which varies with the individual case. It is unwise to carry the patient to term where there is a constant loss of blood. As there is no means of estimating the amount of blood lost, it is rather dangerous to allow the patient to continue bleeding.

This is where blood transfusion plays a part. One should be prepared to transfuse at a moment's notice and should have a donor ready at more or less instant call.

The complications met with in placenta prævia are malpositions and non-engagement of the head. Among the malpositions are breech and shoulder presentation, which are due to the placenta occupying the lower uterine segment.

The pains in placenta prævia are frequently very weak. This accounts for the non-engagement of the head and also, many times, for postpartum hemorrhage. Postpartum hemorrhage is a frequent accompaniment of placenta prævia, due to the fact that the lower uterine segment has not the power of contracting sufficiently to close off the uterine sinuses. The blood-clots which form in the lower uterine segment are not strong enough to check the bleeding. It is fortunate that most of the uterine vessels enter the body of the uterus, so that the contraction of this portion shuts off, to some extent, the flow of blood.

Another complication frequently met with is adherent placenta. It becomes necessary to remove it manually, and the bleeding is sometimes terrific.

In the puerperium the complications met with are infection of a piece of retained placenta which may lead to septic thrombosis of the uterus or broad ligament, and to a typical case of puerperal sepsis, and, second, subinvolution of the uterus, which is frequently met with.

The treatment today is somewhat different from what it was several years ago. At this hospital we confine our treatment to the introduction of bags, the Braxton-Hicks version, and to cesarean section. Generally speaking, in primiparæ near term, with the lateral or central variety of placenta prævia, where the cervix is not dilated, cesarean section is the treatment of choice. In multiparæ who give a history of having had easy labor, where the cervix is partially dilated or easily dilatable, bags are used, and in exceptional cases the Braxton-Hicks version. Generally speaking, the other methods have been discarded. I especially want to condemn the *accouchement forcé*.

We usually introduce the Voorhees' bag, which has a flat top, placing the bag above the placenta. This necessitates rupturing the membranes. The object of the bag is to cause pressure on the placenta in such a manner as to shut off further bleeding. Cragin, in his work on Obstetrics, and recently Kosmak have recommended the extra-ovular introduction of the bag. This means that the placenta and membranes are pushed up from the lower uterine segment and the bag inserted between the placenta and the cervix. They state that this method gives better results. Personally, I have had no experience with this method and therefore cannot express an opinion. The object in any line of treatment should be the saving of blood—to stop the hemorrhage. I wish to emphasize this as strongly as possible. The fetal mortality with the bag in the Braxton-Hicks method is greater than by cesarean section, while our experience proves that the danger to the mother is about equal in any method.

We introduce a large 11- or 12-cm. bag in order to obtain complete dilatation of the cervix. This has an advantage over the smaller size bag in that only one handling is necessary. If the bleeding does not stop after the bag is fully distended, a weight is attached to it and just sufficient traction made to stop the oozing. Frequent rectal examinations are made, and as soon as the bag is found to be in the vagina it is removed either by traction or by emptying it. If the head does not come down readily a version is done and a leg brought down to stop the bleeding. After dilatation is complete one may deliver at once, but I must caution against attempting to deliver a breech through an improperly prepared cervix. As tears are more likely to occur, we, of course, defeat the purpose in that considerably more bleeding is produced. Further, it is very difficult to repair a torn cervix in placenta prævia cases in order to control the bleeding.

It is not necessary to take up cesarean section, as this has been well discussed in the first part of the clinic.

The third stage requires considerable dexterity and judgment in its management. Here, again, we must stop the hemor-

rhage. That is the prime factor. A hypodermic injection of 1 c.c. or mil. of pituitrin is given immediately after the baby is born. This is followed within three to five minutes by 1 c.c. or mil. of aseptic ergot. If the placenta seems to be adherent, it is removed manually. If not, it is allowed to remain five to fifteen minutes, providing the bleeding is not excessive. It is frequently necessary to pack the uterus. This is especially so in those cases in which the cervix has been torn. Our plan is to fill the uterus snugly with from 6 to 8 yards of gauze and then to repair any tear in the cervix by interrupted forty-day catgut sutures over the packing. This controls the bleeding while the repair is going on. After the repair is complete the vagina is packed with wet cotton in order to exert counterpressure. The cotton may be removed in twenty-four to forty-eight hours and the packing from twelve to twenty-four hours later. If the bleeding is not severe and the placenta comes away normally or by means of early expression, the patient is left alone, but is carefully watched for signs of postpartum hemorrhage. In most of these cases it is our practice to give normal salt solution both per rectum and under the skin. We use anywhere from 1000 to 4000 c.c., depending upon the loss of blood.

After-history.—This patient left the hospital on the eighteenth day. Her highest temperature was 99.4° F. on the fourth day and highest pulse was 100 on the second day. She complained only of gas-pains, which were gone on the second day. She was allowed out of bed on the twelfth day. The baby was given mother's milk obtained from other mothers, 20 drops of milk and 20 drops of water every two hours for the first day. The second day this was increased to 30 drops of milk and 15 drops of water. On the third day the baby was put on three-hour feeding and given 2 drams of mother's milk and 1 dram of water. On the fourth day it was put to the breast, where it obtained an ounce. This was supplemented with 3 ounces of mother's milk. It lost in weight, on the fifth day weighing 3 pounds, 14¾ ounces. The effort of nursing from the breast was very tiresome to the baby and was discontinued on the sixth day. The baby then took 6 drams of mother's milk every three hours. On the seventh day

it took 6 drams and on the eighth day 1 ounce, when it started to gain slowly. On the tenth day it was taking 12 drams of milk and weighed 3 pounds, $15\frac{5}{8}$ ounces. At this time Dr. Hoffmann suggested that we feed the baby on albumin-milk in addition to the milk we could obtain from the mother. The mother was milking her breasts daily. The baby began to gain immediately, and at the time of discharge it had regained its birth-rate. On August 15th the baby weighed $9\frac{1}{4}$ pounds.

CONTRIBUTION BY DR. ROY L. MOODIE

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SURGERY AND DISEASE AMONG THE PRE-COLUMBIAN INDIANS OF NORTH AMERICA

Summary: Evidence of disease and surgical practices scanty and confined to lesions on bones and analogies from recent practices. The North American Indians knew less of surgery at the time of the coming of white men than any other primitive people. Trephining unknown north of Mexico; actual cautery used extensively; bandages and splints of a variety of types used in fractures; small tumors excised; phlebotomy used extensively in recent centuries, probably acquired from white men; crutches, possibly introduced by the whites, were in use in the past century; boils and abscesses were opened by flint flakes.

It is impossible at the present time to discriminate between the surgical knowledge of pre-Columbian times and later, when the primitive practices were modified by the influence of their contact with white men.

A variety of diseases indicated by lesions on the bones. Numerous forms of arthritides, periostitis, exostoses seen on skeletal remains. Caries of the teeth moderately well represented. Sarcoma indicated. Fractures often well healed owing to the well-developed practice of using rawhide, pads of clay, lattice-work, and bark splints for the support of the fractured limbs. Presence of syphilis uncertain. Injuries due to war practices, such as arrow-point wounds, are common.

THERE is considerable evidence to show that many diseases prevailed among the Indians north of Mexico prior to the advent of the white people. The condition of the skeletal remains, the testimony of early observers, and the present state of some of the tribes in this regard, however, warrant the conclusion that, on the whole, the Indian race was a comparatively healthy one. It was probably spared at least some of the epidemics and diseases of the Old World, such as smallpox and rickets, while other scourges, such as tuberculosis, syphilis (pre-Columbian), typhus, cholera, scarlet fever, cancer etc., were rare, if occurring at all.



Fig. 338.—1, Splints of bark found in an ancient cliff dwelling of southwestern Colorado. These were padded with wet clay and fitted to the fractured limb, then bound with rawhide. (After Freeman.) 2, Crutches found in cliff dwelling of southern Utah. They may be due to the influence of the whites, though the primitive Indians were skilful in devising supports for the injured. Originals in Field Museum. (After Freeman.) 3, The larger is a peculiar wooden instrument with cupped end, and a hole on one side slanted

Our knowledge of the antiquity of man on the North American continent is limited to the rather indefinite testimony furnished by tradition, by the more definite but as yet fragmentary evidences of archeology, and by the internal evidence of general ethnologic phenomena. No one can speak with assurance on the authority of either tradition or history of events dating back further than a few hundred years, and the highest estimates do not exceed a few thousand years. There is no definite accepted chronology, such as exists for the Egyptian peoples. Careful researches by Hrdlička have shown conclusively that no human remains of any great antiquity have as yet been discovered on this continent, and there seems little chance of their occurrence in this region.

The erection of the mounds by the Mound Builders probably was continued for many hundred years and did not end until after the advent of white men. The mounds vary in extent, measuring from a few feet to 1000 feet in diameter, and also in mode of construction and contents. Many of the data on pathologic lesions given below are based on material obtained from these mounds.

Data regarding the skeletal lesions of the North American Indians are relatively rare, and are to be found scattered throughout a wide range of anthropologic literature and on material contained in many museums. For guidance in the search for the evidences given below I am indebted to Dr. Ales Hrdlička, who has written more than any other student on the diseases of the North American aborigines. Under his supervision there has been assembled at San Diego, California, a large collection of early Indian skeletal remains illustrating this phase of Paleo-

upward, into which a hollow reed could be inserted. This instrument was possibly used in cupping, by pressing the hollowed-out end against the skin, and sucking out the air through the reed. The smaller object is a Cliff Dweller's stone pipe which may also have been used in cupping and in the suction treatment of abscesses and suppurating wounds. (After Freeman.) 4, The object on the left is a sharp-pointed flint flake such as the primitive Indians used in opening a vein or abscess. The one to the right served as a knife. Such flint flakes are very common in archeologic collections. It is not probable that the Indians designed implements exclusively for surgical purposes.

pathology. A catalogue of this important collection has been prepared, but not yet printed. Dr. Hrdlička's papers, in which there are references to early pathology, will be later listed in a Bibliography. Other writers on the Paleopathology of the early races of North America are Parker, Orton, Langdon, and reviews by Fletcher, Lamb, Hyde, Morgan, Bloch, Virchow, and Buret.

KNOWLEDGE OF SURGERY

Surgery among the pre-Columbian Indians north of Mexico was in a comparatively rude state of advancement. They were still in the stone age of culture, and really knew less about surgical procedures than many other races of similar progress. A variety of minor surgical operations was known to them. Major surgery was an unknown field, being indicated only by a few examples of trephined skulls found in northern Mexico. They removed small tumors, and appear to have been versed in the use of the ligature, using in late centuries horsehair for this purpose. Bloodletting, which they doubtless acquired from the whites, was extensively employed, irrespective of the disease. They used a sharp-pointed flake of flint for opening veins, like the one figured on the left in 4, Fig. 338. This was often attached either by rawhide or, later, by an iron pin to a wooden handle. The blood was usually taken from the seat of disease. In severe cases of pains in the head they opened the temporal or posterior auricular vein or artery instead of trephining, as did many of the European peoples in Neolithic times.

The Indians were really skilful in the use of splints for fractures, and they developed a variety of forms of protection for the injured member. They were much further advanced in this regard than the ancient Egyptians. How much the knowledge of treatment of fractures among the Indians was due to the influence of the whites is impossible to say. The evidence points to some pre-Columbian knowledge of the subject. A particularly well healed tibia is shown in 6, Fig. 339. A primitive form of splints is shown in Fig. 338, 1. These were curved pieces of bark, either cut to fit the limb or else padded with wet clay, which, on hardening, made a very good support. This parallels

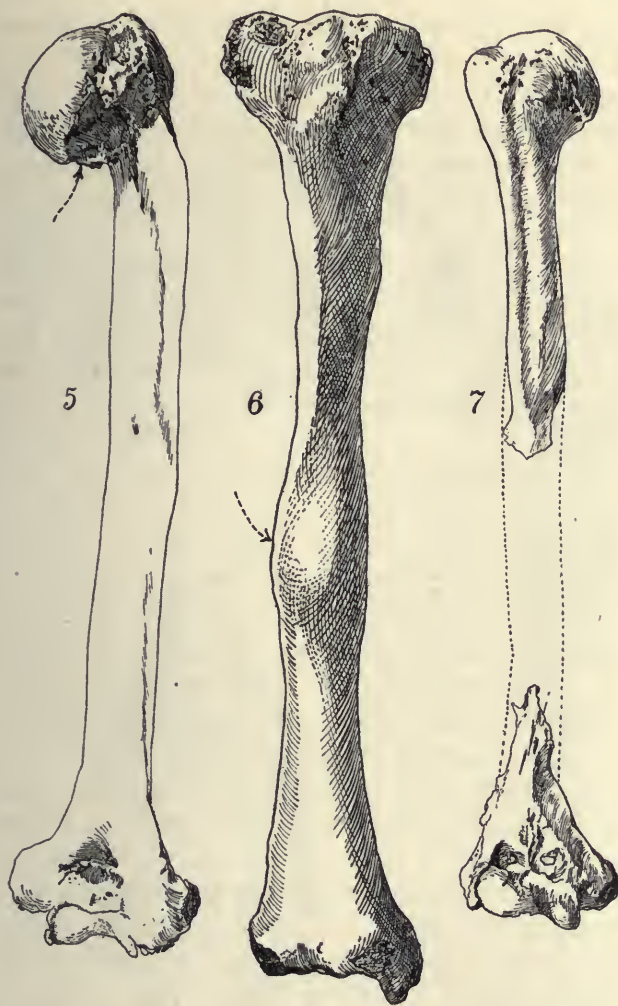


Fig. 339.—5, Fractured humerus, well healed, of a male pre-Columbian Indian from Huichol, Mexico. The lack of deformation may have been due to surgical interference, since it is well known that the Indians understood the use of bandages. Original in the American Museum of Natural History. 6, Well-healed fracture of a right tibia of a male pre-Columbian Indian, anterior view. May's Lick, Kentucky. Original in American Museum of Natural History. 7, Right humerus of a pre-Columbian female Indian, showing a condition resembling sarcoma. The middle of the shaft has disappeared with the remaining ends tapering toward the lesion. Pueblo, San Cristobal, N. M. Original in American Museum of Natural History.

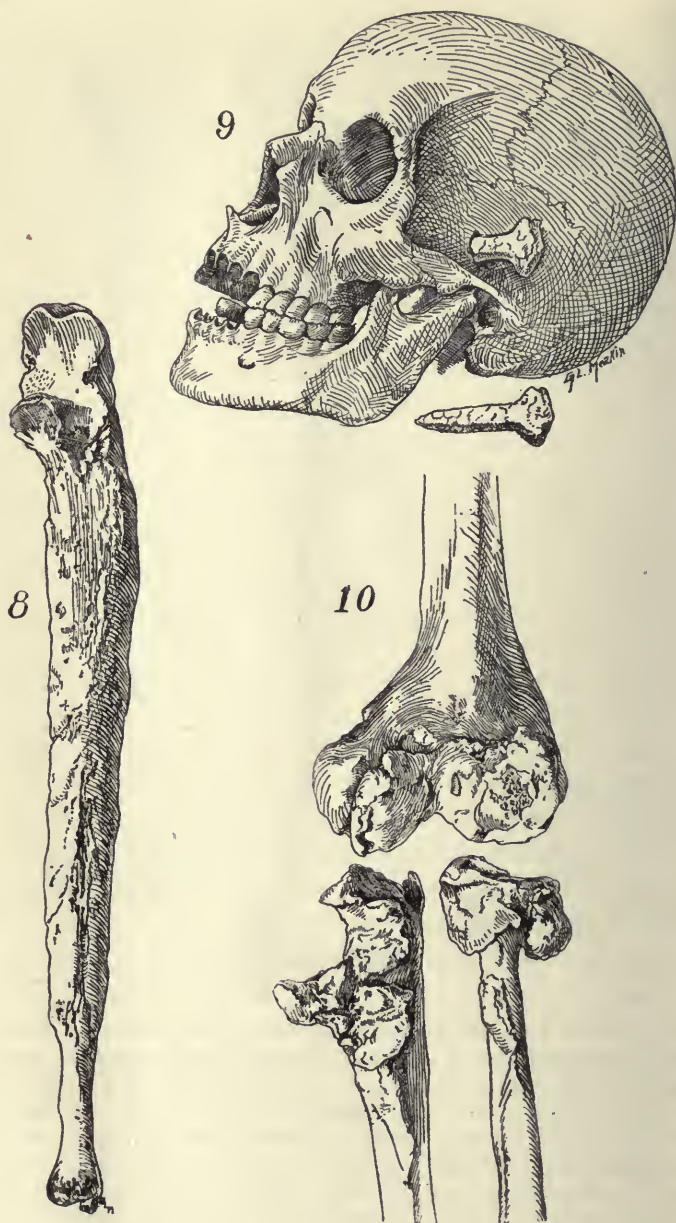


Fig. 340.

and was almost as good a support as a plaster-of-Paris cast. If nothing better offered, strips of wet rawhide were bound tightly around the wounded member. When dry this would make a firm support. Another favorite splint they frequently used was made of a number of thin, light slats fastened together with a buckskin thong, so that the slats are all parallel, and about their own width apart. The flexible lattice work was properly padded and wrapped about the limb. The slats at either end of the splint were drawn together and tied, thus forming a light dressing for many types of injuries. This splint was often used for the prevention of movement of rheumatic limbs. The presence and virulence of arthritic infections are indicated by the lesions shown in 10, Fig. 340.

The North American Indians were also skilful in devising supports for injured members. A rude form of crutch is shown in 2, Fig. 338. They strapped the mammæ in case of abscesses and bandaged the thorax in all pulmonary inflammations. A flint knife, such as the one shown on the right in 4, Fig. 338, was used in opening abscesses and boils. The pus was generally removed by sucking, either directly with the mouth or through a reed. The peculiar wooden instruments shown in 3, Fig. 338, are said by Freeman to have been used in cupping. The smaller instrument is a Cliffdweller's stone pipe used in the suction treatment of abscesses and suppurating wounds. Buffalo horn and other hollow objects were also used.

Amputation may have been occasionally employed, the bleeding being stopped by hot stones. The use of the tourniquet was undoubtedly slightly understood, and other coagulants,

Fig. 340.—8, Hypertrophied ulna of a pre-Columbian Indian from Pueblo, San Cristobal, N. M., showing a congestive osteitis which recalls the results of syphilis. Such evidence is, however, not sufficient to establish the presence of syphilis in pre-Columbian America. Original in the American Museum of Natural History. 9, Ancient (pre-Columbian?) skull of an Indian found in Illinois, perforated in the temporal fossa by a perforator arrow point, with the arrow withdrawn and sketched below. An ancient war injury. Original in National Museum at Washington. (After Wilson.) 10, Elbow-joint of a pre-Columbian Indian from Pueblo Bonito, N. M., showing the result of hypertrophic arthritis, with many eburnated surfaces. The exostoses are of highly cancellous bone. Original in American Museum of Natural History.

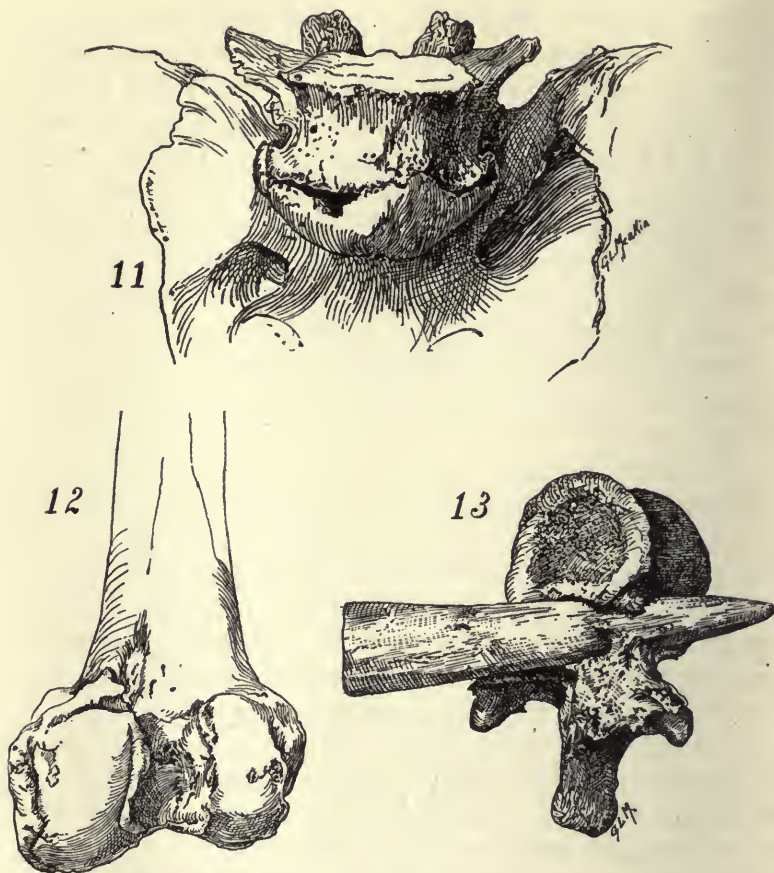


Fig. 341.—11, Exostoses of spondylitis deformans on sacrum, immediately below last lumbar of a male pre-Columbian Indian from Grand Gulch, Utah. Original in American Museum of Natural History. 12, Lower posterior surface of the right femur of a male pre-Columbian Indian from Cora, Mexico, showing lesions of osteo-arthritis. Original in American Museum of Natural History. 13, Lumbar vertebra of an Indian (pre-Columbian?) showing a type of ancient injury. The spear-point of antler has penetrated the canal of the vertebra and has remained fixed after possibly hundreds of years since the injury was inflicted. Death doubtless ensued shortly after the injury, for there is no indication of healing. (After Hrdlička.)

such as spider webs and the fine fibers of plants, were employed. Operations for the removal of the pterygium was probably the only knowledge of ophthalmology among the Indians.

The knowledge of anesthetics among the pre-Columbian Indians was not extensive, though they knew the use of certain substances. The Zunis and other tribes employed a substance obtained from the jimson weed (*Datura meteloides*), containing stramonium. It was administered in sufficient quantities to produce indifference to pain or even complete unconsciousness, and in this condition abscesses were opened, fractures set, dislocations reduced, and other surgical procedures accomplished. This, according to Freeman, represents the knowledge of the Indians in modern times. It doubtless merely suggests the state of knowledge among the more ancient peoples who inhabited this continent. In this connection may be also mentioned the psychic states induced by the medicine men with their bizarre make-ups, wierd incantations, and fantastic antics, all of which were well calculated to make a profound impression on their credulous patients.

Trephining was practised among the Tarahumare Indians of Chihuahua in northern Mexico, but this did not spread north of the Rio Grande. The few examples known are doubtless to be traced to influence emanating from Peru, where trepanning was extensively performed.

EVIDENCE OF PATHOLOGY AMONG AMERICAN ABORIGINES

The pre-Columbian Indians of North America suffered from a variety of injuries and disease, many of which resulted in surgical conditions. Whitney¹ has discussed these in his excellent contribution to paleopathology, in which he describes a variety of traumatic conditions, such as skull fracture, arrow-point wounds, fracture of the clavicle, arm, femur, as well as luxation of the hip, congenital and otherwise. Among the constitutional affections he mentions a variety of exostoses, periostitis, arthritides, caries, and doubtful evidences of syphilis.

It is curious to note that there are in the Peabody Museum, Harvard University, found in the stone graves of children in

¹ Whitney, William F.: Notes on the Anomalies, Injuries, and Diseases of the Bones of the Native Race of North America, Peabody Museum Reports, 1886, iii, 433-448.

Tennessee, Arkansas, and Missouri, little clay images which are faithful representations of persons affected with Pott's disease, and that many of the water-bottles from the stone graves of Tennessee and from the mounds of Missouri represent women with hunchbacks. Pott's disease is seldom indicated on skeletal remains, and it is possible that the clay images do not indicate any great prevalence of vertebral tuberculosis in these localities, but represent other spinal deformations.

The skeleton of an adult and a portion of the lower jaw of an infant were discovered near Lansing, Kansas, in February, 1902. There has been considerable discussion of the antiquity of this skeleton, but there seems to be no proof that it is very ancient. Hrdlička¹ is of the opinion "that the Lansing skeleton is practically identical with the typical male skeleton of a large majority of the present Indians of the Middle and Western states."

The skeleton, whatever its age, shows evidence of osteitis deformans, with interesting arthritides, which have been described by Dr. Charles Parker.

The lumbar vertebræ, a metatarsal, the articular surfaces of the right femur and tibia show evidences of deforming arthritides. The lumbar vertebræ show the phalanging typical of spondylitis deformans, a disease which is common among various ancient as well as modern peoples. An exostosis occurs on the external condylé of the femur. The articular surface of the bone at the place of bearing in semiflexion exhibits the typical eburnation of rheumatoid arthritis, with the characteristic striæ, which average a millimeter apart, and are reciprocal with similar ones on the tibia. The few slight changes seen in the skeleton probably offered no inconvenience to the original possessor other than an occasional "rheumatic" pain in the knee-joint or an unpleasant twinge of the great toe.

The skeletal remains of the Mississippi and Ohio Valley mound builders not infrequently exhibit gross pathologic changes. The lesions of some of the bones examined by Orton led him to

¹ Ales Hrdlička: Skeletal Remains Suggesting or Attributed to Early Man in North America, Bull. 33, Bur. Amer. Ethnol., Wash., 1907, 52.

make a diagnosis of syphilis as their etiologic factor. The changes he observed affected chiefly the diaphyses, consisting of large exostoses and osteophytic overgrowths, and characterized by the presence in the same specimen of both a rarefying and condensing osteitis, as demonstrated by gross and microscopic examination. Of 127 skeletons examined from one series of excavations, 21 showed traces of disease, 60 per cent. of the affected skeletons showed changes, most upon the tibia, with the ulna, cranium, and sternum following in order. The exact age of these remains is uncertain.

The old Mound Builders of Missouri exhumed by Fowke show in the jaws and remnants of the alveolar processes an unusual prevalence about the roots of the teeth of pathologic conditions of an inflammatory and suppurative nature. A number of the femora and tibiæ present pathologic conditions of a protracted inflammatory nature, possibly to be regarded as syphilis.¹

The general nature of disease in relation to the early inhabitants of North America may be gathered from the conditions observed² in the skeletons of the Lenape Indians or Delawares, dating from the seventeenth century:

"The bones in the collection were exceptionally free from the effects of injury and disease. The skulls exhibit no scars or injuries, and no disease, with the exception of a case of perforating mastoiditis in one of the children. There is, however, a considerable proportion of dental caries, with some indication of *pyorrhea alveolaris*."

Evidences of injury with the formation of callus, complete ankylosis of humerus and ulna, periostitis, osteoperiostitis, osteitis deformans, slight arthritides, fractured ribs, and spondylitis deformans were observed on the 57 skeletons examined. Only four diseased conditions were observed, and there were no evidences of syphilis, rickets, tuberculosis, or tumors of the

¹ Ales Hrdlička: Report on Skeletal Material from Missouri Mounds, Collected in 1906-07 by Mr. Gerard Fowke, Bull. 37, Bur. Amer. Ethnol., Wash., 1910, 103.

² Ales Hrdlička: Physical Anthropology of the Lenape or Delawares, and of the Eastern Indians in General, Bull. 62, Bur. Amer. Ethnol., Wash., 1916, 16.

bones. Of the teeth lost through caries, among the males 13 per cent. were lost in life, while 12 per cent. of those still present show evidences of more or less decay. The conditions found in these Indians is doubtless a guide to the prevalence of disease in earlier times, and if so, diseases were of relatively slight importance to the American aborigines.

Other diseases and injuries are described among certain of the Mound Builders of Arkansas and Louisiana. This material shows traumatic lesions and dental caries, with healed scars which suggest syphilis. An Indian skeleton from Louisiana exhibits a femur which had a badly united fracture with callus. Many of the long bones show signs of constitutional disease, as well as osteoarthritis, marginal exostoses, fractures, and localized suppuration. There is no definite evidence of rickets, tuberculosis, bone tumors, or necrosis of the bones. A series of vertebræ, consisting of the lowest dorsal and upper three lumbar vertebræ, show a diseased condition, the series being bent forward and ankylosed.

Langdon examined 662 skeletons of "pre-Columbian" (?) Indian skeletons, and has devoted a special section of one of his studies to pathology. A nearly entire series of vertebræ was ankylosed by spondylitis deformans. Other bones showed extensive osteo-arthritis of the jaw, vertebræ, ribs, ilia, and carpals. Periostitis, osteitis, osteomyelitis, hyperostoses, and other evidences suggested syphilis. Of 141 crania examined, only 11 exhibited fractures, which, in a war-like people, is very unusual.

Syphilis among pre-Columbian races of North and South America is still a mooted question and has been discussed by a number of writers. Jones¹ suggests this disease as the cause of certain pathologic changes in the bones of the aborigines of Tennessee. Bloch has reviewed the entire question of prehistoric and pre-Columbian syphilis, with no definite conclusion reached. Hrdlička regards the evidence as still inconclusive.

¹ J. Jones: Explorations of the Aboriginal Remains of Tennessee, Smithsonian. Contrib. to Knowl., Wash., 1876, 49, 61, 65, 73, 85.

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IMPORTANT ANNOUNCEMENT

The great success attained by the Surgical Clinics of Chicago and by the Medical Clinics of North America has induced us to respond to the demand from all over the country to begin the publication of

THE SURGICAL CLINICS OF NORTH AMERICA

With the current number (December, 1920) the Surgical Clinics of Chicago ceases as a separate publication, and will be merged into THE SURGICAL CLINICS OF NORTH AMERICA. The first number of the Surgical Clinics of North America will be published in February, 1921, and each succeeding number every two months. Each number will be devoted exclusively to the work at one great surgical center.

The Philadelphia number (February, 1921) will record the work of the leading surgeons there connected with the University of Pennsylvania, the Jefferson Medical College, and the Graduate School of the University of Pennsylvania.

The New York number (April, 1921) will include the work done at the various hospitals by the surgical department of Columbia, Cornell, Bellevue, and the Postgraduate School.

The Boston number (June, 1921) will include Harvard, Massachusetts General Hospital, Boston City Hospital, Peter Bent Brigham Hospital, and Free Hospital for Women, etc., etc.

THE SURGICAL CLINICS OF NORTH AMERICA will be kept up to the standard that has been maintained in the Medical Clinics of North America, and will follow the same general plan.

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SURGICAL CLINICS OF CHICAGO

Volume 4

Number 6

CLINIC OF DR. ARTHUR DEAN BEVAN

PRESBYTERIAN HOSPITAL

EXSTROPHY OF THE BLADDER

Summary: Various procedures designed for cure of exstrophy of the bladder. The Sonnenburg plan the method of choice. Application of this method to the patient presented for operation—technic. After-history of case.

It is my intention this morning to present to you the subject of exstrophy of the bladder and to operate upon a case.

This patient is eleven years of age, a bright and fairly well-nourished boy. He has been referred to me by an old colleague of mine who is now practising in Texas. You will see, on examination, that there is a cauliflower or, possibly one might better describe it, a tomato-like mass projecting above the symphysis in the region of the bladder. As you examine this carefully you will note that this mass is the mucous membrane of the posterior wall of the bladder. The anterior wall is entirely absent. At the lower portion of this mass you will notice occasionally urine coming out in small spurts from the open mouths of the two ureters, and just below the ureters is situated a small rudimentary penis, which is also malformed and presents a complete epispadias. An *x*-ray picture of the pelvis in this child shows a failure of union of the pubic bones. They are separated a distance of about $\frac{3}{4}$ inch or more. This is the usual condition in these cases of exstrophy. The child has a double hernia and double undescended testes.

I have operated on a good many of these cases of exstrophy of the bladder, and have tried out the various plans of operation that have been suggested from time to time. I might before proceeding to etherize and operate on this patient give you a short sketch of the various plans that have been worked out.

When I was a medical student and Gunn was in charge of our clinic the operation that was being experimented with was a plastic, in which an effort was made to build a new anterior wall for the bladder and to make some sort of receptacle for the urine. Three skin-flaps were usually employed in this effort. As a student I had an opportunity of seeing several of these cases operated on, and the results were very unsatisfactory. I could never satisfy myself that any benefit had been derived from these plastic operations designed to build a bladder from skin-flaps, and this evidently was the general conclusion, because after a short trial the operation was abandoned. The next step that seemed to promise something of value was the transplanting of the ureters into the intestines, especially into the sigmoid or rectum. This operation was at first regarded as a great step in advance, and a number of cases were reported, especially shortly after the operation, as being complete successes and quite wonderful cures. Within a few years, however, we soon learned that a majority of these little patients died from ascending nephritis. After the ureters were transplanted into the rectum or sigmoid an infection would gradually travel up the ureter to the kidney, and the patient would sooner or later die as a result of this ascending nephritis. On that account it was necessary to abandon the transplanting of the ureters alone. Then came the suggestion that we should transplant the entire base of the bladder into the sigmoid, the Maydl operation, Maydl's conception being that when he transplanted the entire base of the bladder with the protecting sphincter action at the lower end of the ureter this would prevent any ascending infection. There was probably some basis for this idea. In spite of that fact, however, a great majority of these patients also died of ascending infection. The operation itself carries a good deal of risk—I mean the immediate operative mortality is large.

The next plan that was suggested that seemed to carry with it a good deal of value was the Peters operation, devised by a Canadian surgeon, Peters. It was a very clever plan of introducing the ureters into the rectum by the extraperitoneal route.

The Peters operation is a very simple one, and it seems to me if a transplantation into the intestine is to be attempted in a given case the Peters plan should be selected. The steps of the operation are briefly these: Under an anesthetic the ureters are dissected out for a distance of 2 or 3 inches, and then, placing the patient in the lithotomy position, the sphincter is dilated and with a pair of closed artery forceps an opening is made from just above the symphysis, the original position of the ureters in exstrophy, through the connective tissue to the anterior surface of the rectum just above the sphincter. The closed artery forceps is pushed through the rectum at this point, the blades are then opened, and a fair-sized tunnel is made. The two ureters are then stitched together by fine catgut sutures and are carried through this tunnel into the rectum, and are then stitched with fine silk suture to the rectal mucosa. I should mention the fact that in this plan of Peters a good-size rosette of mucous membrane and tissue at the outlet of the ureter is dissected off with the ureter, so as to attempt to retain as far as possible the sphincter action at the mouth of the ureter. After transplantation of the ureters into the rectum the mucous membrane covering the posterior wall of the bladder is dissected off completely, and this huge defect in the anterior abdominal wall is then closed by invaginating the muscularis of the bladder with purse-string sutures and then covering this with skin-flaps.

I have done a number of these Peters operations, and some of them have been quite successful. I have several patients living some years after operation in comparative comfort. On the other hand, unfortunately, many of these cases develop an ascending nephritis with an eventually fatal termination.

We come now to the next step in advance in this work, which, to my mind, has proved to be the safest and best plan that has been so far suggested. This is the operation introduced by Sonnenburg, of Berlin, and that is the operation that I shall perform upon this child this morning.

The patient is now anesthetized and I shall proceed to do the operation after the Sonnenburg plan. The first step is to

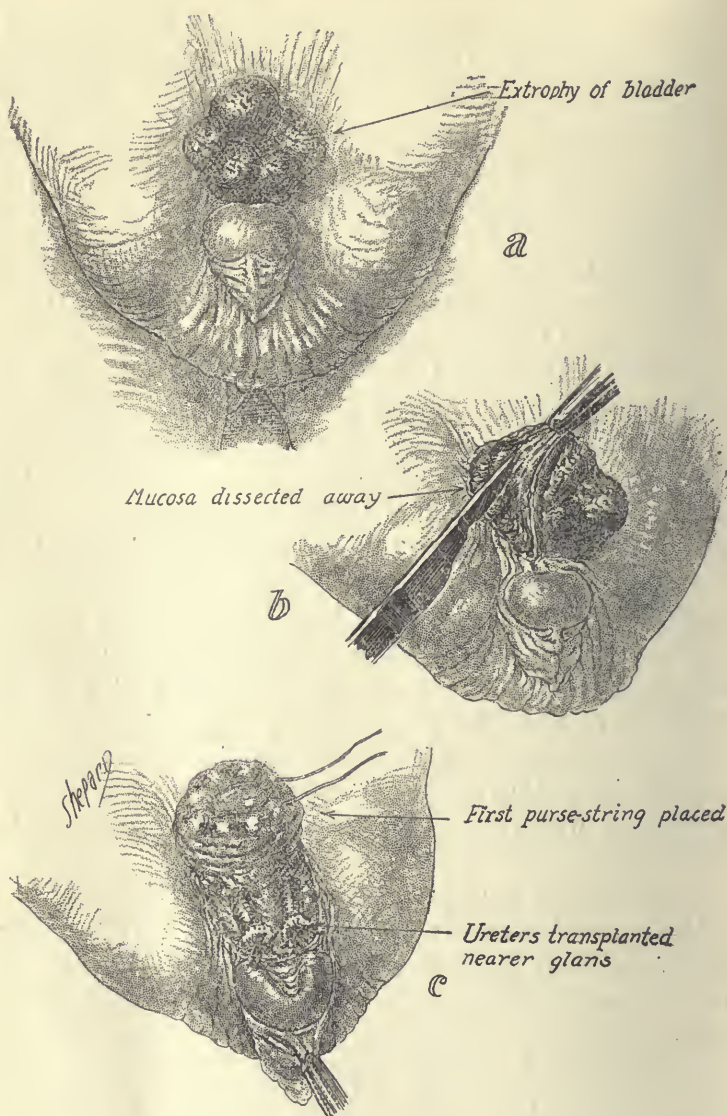


Fig. 342.—*a*, Condition before operation. *b* and *c*, Technic of operation.

isolate the ureters and to dissect them out, so that we can pull the completely freed ureter out from its bed for a distance of about 1 or $1\frac{1}{2}$ inches. This is a fairly simple matter. I intro-

duce a fine ureteral catheter into each ureter and dissect out a small rosette at the outlet of the ureter and divide the mucous membrane over it. With careful dissection I am now freeing the ureter for a distance of about $1\frac{1}{4}$ or $1\frac{1}{2}$ inches on either side.

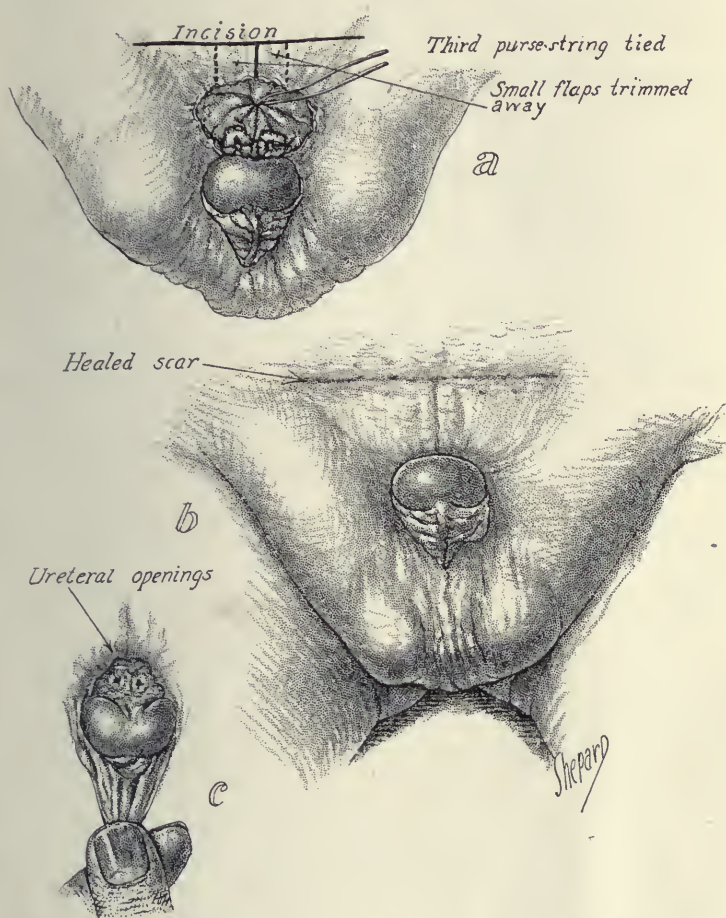


Fig. 343.—*a*, Technic of operation. *b* and *c*, Result after operation.

The purpose of the operation is to transplant the two ureters to the base of the epispadias, to then remove all of the mucous membrane of the bladder, to invaginate the bladder muscularis in order to strengthen the abdominal wall at that point, and then

cover the raw surface with skin-flaps. After the operation has been made and wound healing is complete we have simply a small opening at the site of the two ureters and at the base of the epispadias. We have done away with all the raw surface of the bladder and have completely closed this with skin-flaps. This enables us to have the patient wear a rubber urinal in which the urine is readily collected and which he can attend to himself, emptying it every few hours and seeing that it is kept clean and free from odor.

Proceeding with the operation, you will notice that it is rather difficult to dissect off the mucous membrane of the bladder, and in order to make this easier I inject between the mucous membrane and the muscularis some sterile salt solution containing 1 : 100,000 adrenalin. This blows up the areolar space between the mucosa and muscularis and makes the dissection less difficult. It has this advantage, also, that the adrenalin controls to a large extent the bleeding. I have now removed all the mucous membrane and what projects out now is the muscular wall of the posterior half of the bladder. I have learned to handle that in a simple way. I invaginate this with three purse-string sutures just as I invaginate an esophageal diverticulum. I use the same principle also in invaginating the sac of a direct hernia. These three purse-string sutures are now applied one after the other and turn the bladder into the abdomen. I now make a T-shaped cut, one a horizontal incision just above the former line of the bladder mucosa, and a vertical one, and free two rather large flaps of skin and superficial fascia, which I carefully slide over the raw surface and hold them in position by sutures. You will see that we simply have at the lower angle a large T-shaped incision and at the base of the epispadias, projecting slightly, the lower end of the two ureters. The rest of the raw surface is now completely closed. I have learned by experience that the best dressing for these cases is sterile zinc oxid paste. I put a rather thick coating of this oxid paste on a layer of gauze and cover the suture line. You will remember that I called your attention to the fact that this patient has a double undescended testes, a double hernia, and

epispadias. I would not advise operation for the hernia or for the undescended testes at present. After the boy has made a good recovery from his exstrophy operation we might consider correcting the hernia and malposition of the testicles. I would not at any time suggest any operative procedure for the epispadias, as it would be out of the question with the associated exstrophy.

After-history.—The boy made an excellent recovery from the operation. Fortunately, the skin-flaps lived and there was no necrosis. Union was practically by primary intention. He had for some days a low, continued fever that worried me considerably, and I thought of the possibility of a nephritis developing in his case. We could not at any time make out definitely any kidney involvement. He had some cough, and I am rather inclined to ascribe his temperature to a slight postoperative bronchopneumonia, although the physical signs of such a condition were not marked.

After he had made a complete recovery from the operation his mother became alarmed one day because he developed evidences of strangulation in the hernia on the right side. Fortunately, however, this was reduced, but I am inclined to believe that the risk of a recurrence of this strangulation will necessitate our doing a hernia operation in order to prevent any serious complications.

The problem is now one of devising the right sort of apparatus that will catch and retain the urine as it dribbles from this small epispadias opening. A good deal of ingenuity is required to fit a rubber flange over the opening so as to make it fairly water-tight and keep the patient dry after these operations, and yet with a little care and study and the assistance of a good instrument maker this can be accomplished. Personally, I am convinced that this Sonnenburg operation is the best procedure that we can employ in these cases of exstrophy, that it is safe for the patient both from the standpoint of immediate mortality and from the standpoint of longevity. I believe that with proper care and attention these patients can be made more comfortable than by any other method of handling cases of exstrophy.

ABSCESS IN THE DEEP CERVICAL FASCIA OF THE NECK

Summary: An infant three months old, with a rapidly developing goiter, producing pressure on esophagus and trachea. Aspiration reveals an abscess in the deep cervical fascia. Evacuation of abscess by the Hilton method.

My assistant, Dr. Gatewood, and my colleague, Dr. Grulee, have just called my attention to a second case this morning that I shall present to you, first for your diagnosis, and second, probably, for surgical operation.

This infant, three months of age, has been referred to our service with the diagnosis of a very rapidly developing goiter, producing pressure on the trachea and esophagus. As you look at this little chap you see a large swelling on both sides of the neck consistent in a general way with an enlargement of the thyroid gland. As you examine it, however, you will find that whatever the swelling is it presses the trachea forward so that the trachea is very superficially situated, and, of course, this is not the ordinary picture of thyroid enlargement. It must be a very atypical case and one in which the atypical thyroid is situated between the esophagus and trachea. This is, of course, sometimes the case, but it is a great rarity. The little patient is starving to death because of the inability to swallow and, as you see, this morning he is having great difficulty in breathing, evidently because of pressure on the trachea.

The history given by the attending physician and parents is that he had first a sore throat. This sore throat was followed by the rather rapid development of what has been regarded as an enlargement of the thyroid gland. As I examine the neck carefully I find that in this enlargement a very definite fluctuation can be obtained, which is transmitted from the right to the left side. I believe that we may be able to obtain some evidence by introducing a hollow needle into the mass and seeing if we can aspirate any of the contents.

Injecting with a fine hypodermic needle $\frac{1}{2}$ of 1 per cent. novocain through the skin and superficial fascia and fairly deeply

into the masses in order to benumb the tissues, I now take a good-sized aspirating needle and syringe and very carefully introduce it into the mass. When I withdraw the piston you will see the syringe filled up with a thick yellow pus. We evidently have to deal with a huge abscess under the deep cervical



Fig. 344.—Abscess in the deep cervical fascia of the neck in an infant three months old.

fascia, occupying the compartment in the deep cervical fascia which passes between the esophagus and the trachea or passes behind the esophagus, between the esophagus and the vertebræ. I now introduce through the skin and superficial fascia a fine knife, leaving the aspirating needle in position. I then

introduce alongside the aspirating needle a pair of closed artery forceps and open this abscess by the Hilton method, a method that should be employed always in these deep abscesses about the neck. One is much less apt to do injury to the important structures, such as the great vessels and nerves, by this method than he would if he used a knife and dissected directly into the abscess. Opening the artery forceps, a great gush of thick yellow pus comes out, covering the child, the clothing, and the sheets in which we have wrapped it. You will notice that although my incision is on the left side, by a little pressure on the right side of the swelling I can also empty completely the right pocket, so that the swelling has now disappeared completely.

This case is now no longer a problem. It is clearly an infection, beginning as a sore throat, followed by infection of the soft tissues of the neck, possibly some lymphatic nodes, and resulting in the development of an abscess in the deep cervical fascia, as I have already said, in the compartment between the vertebræ and the esophagus, or between the esophagus and the trachea, forming in this way a huge hour-glass or dumb-bell-shaped abscess. Fortunately, the pus was so situated that it did not pass into the posterior mediastinum or into the anterior mediastinum, in which event it would almost certainly have been fatal.

The case presents one of those problems that has to be unraveled not by laboratory methods, but by the methods that surgeons have learned in careful study of the gross clinical pictures of other cases, in the application of some of the principles that have been known for years, of palpation, which in this case detected fluctuation, the aspiration of the contents to determine the character of the fluid, and the employment of the Hilton method of opening deep abscesses of the neck. These are the things that have enabled us to save this little patient's life. They are the lessons in practical surgery that all must learn if we are to become successful practitioners of surgery.

After-history.—The little patient made a very rapid and complete recovery after drainage was instituted.

HYPERNEPHROMA

Summary: Difficulty of diagnosis in atypical cases of hypernephroma—absence of urinary findings not uncommon and frequently misleading. Complicated clinical pictures in hypernephromas which secondarily involve the liver. Bone involvement not an infrequent sequel of hypernephroma. History and operative findings in present case. Prognosis in these cases—use of the x-ray an important part of the after-treatment. After-history.

YESTERDAY morning my colleague, Dr. B. W. Sippy, asked me to see a patient with him. He had been studying the case for about a month, but had been unable to arrive at a definite conclusion.

The man is about fifty years of age. He has been losing weight and strength very rapidly in the last few months. He has had more or less temperature and a fairly high leukocyte count. The case has been apparently studied from every possible angle. There are no stomach findings, no intestinal findings, a negative Wassermann, and nothing in the thoracic cavity. The urine examination is negative—no pus or blood. On careful physical examination of the abdomen a mass can be felt in the region of the left kidney. This mass is somewhat tender. The patient has had no pain. Dr. Sippy had the patient cystoscoped by Dr. Robert H. Herbst. Catheters were passed into both ureters and a careful examination of the urine obtained independently from the two sides without securing any evidence. The pelvis of the left kidney was filled with thorium solution and an x-ray plate taken, which showed no defect of the pelvis. Dr. Herbst's interpretation is that it is probably a case of tuberculosis of the left kidney. The x-ray picture shows very definitely the outline of the mass which one can palpate on the left side. It is a round mass attached to the lower pole of the left kidney. After submitting to me all the facts Dr. Sippy asked me my opinion. I told him that I was unable to make a definite diagnosis; if it was tuberculosis it certainly was atypical, but I thought, on the whole, the most probable thing was a hyper-

nephroma. Dr. Sippy advised strongly an exploratory, and I agreed with him that that was the best thing that could be done in the case.

The patient is now etherized and I shall proceed to make the exploratory, exposing the left kidney. I begin the oblique incision about a fingerbreadth above the crest of the ilium, passing upward and backward to the angle between the spine and the last rib (Fig. 345). This divides the skin and superficial fascia and the latissimus dorsi muscle. I expose now the posterior border of the external oblique and come down to the posterior layer of the lumbar fascia. Both of these structures are divided. I now come down to the anterior layer of the lumbar fascia, which is also divided, and I expose the fatty capsule of the kidney. Introducing both hands into the incision, I retract the tissues fairly widely from the same source, and in doing this I intentionally fracture the twelfth rib, which gives me a great deal more room. I have found by experience that it is better to break the rib with the hand than to resect it. One is much less apt to do any damage to the pleura. I come down to a large mass extending from the left kidney down toward the iliac fossa. I separate carefully the fatty capsule of the kidney from this mass and from the kidney proper, freeing the kidney first posteriorly and then in front, then the upper pole and then the lower pole, bringing the kidney and this mass out through the external incision. This mass is filled with some putty-like material, some of which escapes, because I have ruptured the capsule containing it in the force employed in delivering the tumor. The material is somewhat suspicious of the caseation of tuberculosis, and yet it seems distinctly different. I next clamp the ureter between two curved forceps and divide the ureter. Then I apply to the blood-vessels of the kidney a full-curved forceps which I employ in doing cholecystectomies, using it to clamp the cystic duct. I am very fond of using these forceps here in a nephrectomy because on account of the shape of the forceps it enables one very easily to apply the ligature (Fig. 345). I now divide the vessels distal to the clamp and deliver the tumor and the kidney. I have asked Dr. Herbst, who has been very much interested in

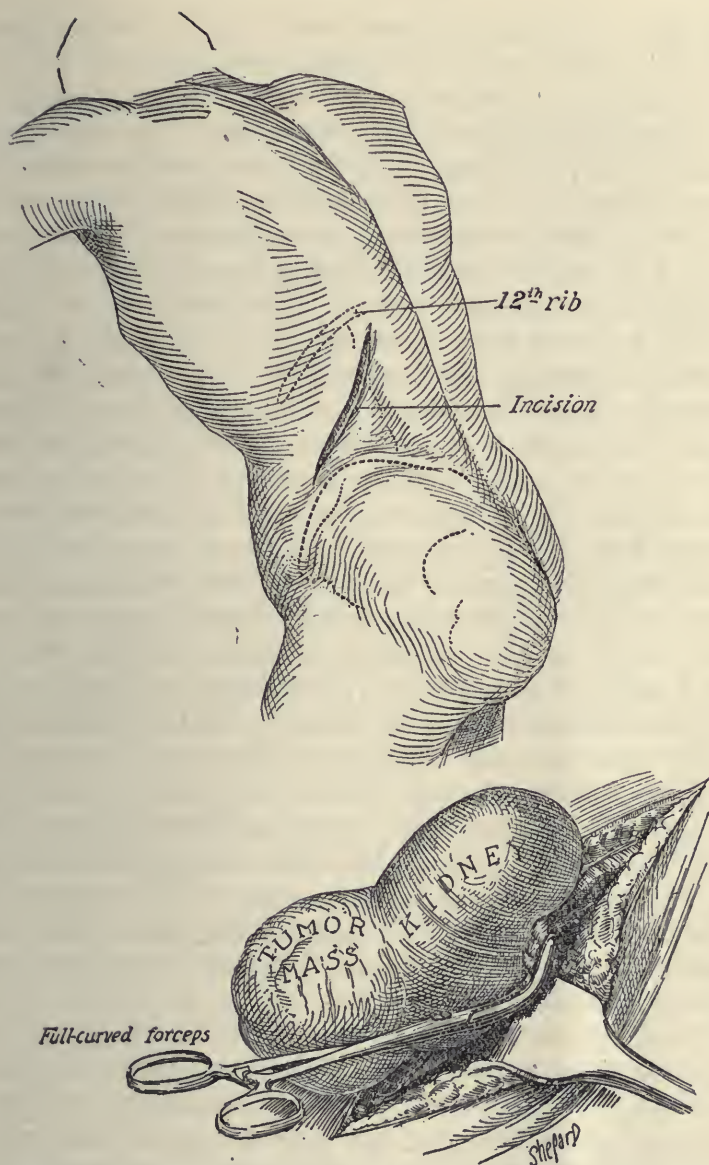


Fig. 345.—Incision for removal of kidney. Full-curved forceps applied to blood-vessels of kidney. The shape of the forceps permits of easy application of ligature.

the case, to examine the specimen and to let me know his opinion of the pathology from a naked-eye examination.

Opening up the tumor, as he does, you will see it is a typical hypernephroma, the round projecting mass from below being made up in part of solid hypernephroma tissue and partly of some softened material the result of a degenerative process. You will notice one interesting complication in this case, and that is, in the fatty capsule distal to the tumor there is what appears like a secondary tumor, which I dissect out now, going widely into what looks like normal fat. This is clearly an extension of the hypernephroma into the fatty capsule outside of the kidney itself. On splitting this open I find it has also undergone a degenerative process, the center of it having softened down into the same material that we found when we ruptured the main tumor. Inasmuch as this is clearly a hypernephroma, I come back now to the treatment of the ureter. I find that I have divided it well below the pelvis and at a safe distance from the tumor itself. I simply ligate the ureter without any attempt at excising it widely. I then ligate the renal vessels with medium-sized catgut; I place a second catgut ligature a little distal to the first and then remove the clamp. I find the bleeding is entirely controlled. Some blood-clots which have formed in the large cavity from which the kidney was removed are carefully mopped out, cigarette drains are left in the dead space, and the incision is closed with catgut through the muscles, silkworm-gut through the skin, superficial fascia, deep fascia, and superficial layer of muscles, and silk through the integument itself. The pads and sponges are all accounted for and the patient is in very good general condition.

I want to take this opportunity of discussing some of the practical points in connection with hypernephroma. I want to first make the statement that my medical colleagues and I have handled together a large number of these hypernephroma cases, and I think they will agree with me when I say that no other condition in the abdomen has given rise to so much uncertainty in diagnosis in some of the atypical cases as has the condition of hypernephroma with the secondary invasions that are very

often associated with it. Unless one is fairly familiar with this condition and has studied a large number of cases one is prone to expect with hypernephroma the occurrence of definite findings in the urine. Now, as a matter of fact, in about 50 per cent. of the cases there are no urinary findings at all. Of course, in a certain number of cases we do have blood in the urine and sometimes extensive hemorrhage and sometimes the picture of typical renal colic from obstruction due to blood-clots in the ureter. On the other hand, one must not be surprised to find hypernephroma, even well advanced, that has not given rise to any urinary findings. In cases where we find extensions of the hypernephroma to the great vessels, to the liver and other portions of the abdominal cavity, we may have singularly atypical pictures. Let me tell you of our experience.

An old classmate of mine came to me a few years ago complaining of the fairly sudden development of a marked varicocele on the right side. He had lost some weight and strength, but otherwise seemed to be in fairly good condition. Careful examination failed to reveal any definite explanation of the condition. Within a few weeks he had some blood in the urine. This alarmed him, and he came back to see me, and I found on examination a tumor developing in the region of the right kidney. At exploratory operation I found an already inoperable hypernephroma of the right kidney which had extended into the veins, blocked up the spermatic veins, and produced the marked varicocele.

Another case comes to my mind of a patient seen by Dr. Sippy and myself, whose first signs of serious trouble was some process that blocked up the ascending vena cava with an enormous edema of the lower extremities, and eventually a collateral circulation relieving the condition somewhat. At an exploratory operation an inoperable hypernephroma was found.

Hypernephromas involving secondarily the liver give rise to complicated pictures suggestive sometimes of gall-bladder disease or carcinoma of the liver and pancreas. Another interesting group of cases is furnished by the extensive bone involvement secondary to hypernephroma. Some time ago a child, the

daughter of a physician, was brought to my service. She had been playing with some children at school. Suddenly she felt something snap in her hip and she fell to the ground. She was carried home and found to have a fracture of the upper end of the right femur. x -Ray examination showed beautifully the characteristic destructive process due to the invasion of the bone by a malignant growth, and the process was found not only at the site of the fracture, but to very extensively involve almost the entire skeleton. After careful analysis of the case the tumor was found in one kidney. Later a little blood was found in the urine and the termination demonstrated distinctly the presence of a hypernephroma with secondary, very extensive bone involvement.

Hypernephromas furnish the common type of malignant tumor of the kidney; 75 or 80 per cent. of the malignant tumors of the kidney which we have had to deal with on our service have been hypernephromas, the sarcomas that occur in the kidney forming the second group in frequency, carcinoma of the kidney being a comparatively rare lesion.

In regard to the prognosis I can give you these facts. In a report from the Hochenegg Clinic, made several years ago, of 34 cases in which nephrectomy had been done for hypernephroma, but 1 was alive without evidence of recurrence at the end of three years after operation. My own experience has not been as discouraging as this. We have had a number of apparently permanent cures after nephrectomy for hypernephroma. I am inclined, however, to ascribe this, in part, to our insistence upon the use of the x -ray as a very important part of the after-treatment. The discovery of the peculiar salutary effect of the x -ray on hypernephromas was the result of the study of a case which I had with Dr. Billings a number of years ago. After doing an exploratory operation on a patient with a kidney tumor, removing a small section of the tumor for the purpose of diagnosis and finding the mass inoperable, we used the x -ray as the best means of palliation. Much to our surprise and to our gratification the very large tumor gradually and fairly rapidly disappeared. The patient improved very much in weight and strength and

went on to what appeared to be a complete recovery. Within a year, however, he developed evidences of secondary masses in the liver and finally died of the disease. The really enormous impression made upon the tumor by the *x*-ray encouraged us to use it in all of our cases after that time. In the cases that were inoperable we found quite consistently that the tumor diminished quite markedly under the use of the *x*-ray. In the cases where we can do a radical operation we employ the *x*-ray as insurance against return, or at least against a rapid return. We have had some very satisfactory experiences, such as this—nephrectomy for hypernephroma, recurrence at the site of the scar within six or eight months, and total disappearance of this recurrence under *x*-ray treatment, with the patient alive and well three or four years after the recurrence was first noted. From our experience I feel that we can say with a good deal of certainty that the *x*-ray has a selective action for the peculiar hypernephroma cells, somewhat the same sort of action that it has for the lymphatic tissue in Hodgkin's disease or the tissues of an enlarged spleen in leukemia. One must, on this account, not crowd the *x*-ray too rapidly, because some of these patients suffer from a marked toxemia the result of too rapid breaking down of the tumor cells under the *x*-ray. One, of course, would not be warranted in trusting to the *x*-ray alone in cases of hypernephroma, the proper therapy undoubtedly being the removal of the tumor in operable cases and the subsequent employment of the *x*-ray. I have investigated its value in these cases, and I want to advocate very strongly its general employment.

After-history.—The patient went on to a very satisfactory operative recovery. Within ten days we began the use of the *x*-ray as a means of prohibiting rapid extension of the growth, because we feel, on account of the extension outside of the kidney capsule in the fatty capsule, that there is little prospect of permanent cure. The after-history was of interest from the fact that the temperature, which had for weeks been running from 100° to 101.5° F., and the marked increase in the leukocyte count both at once disappeared. Another fact of interest was the rapid increase in weight and strength; the patient instead of

losing 8 or 10 pounds, as patients usually do in the two weeks following an operation, gained 8 or 10 pounds.

These facts, the disappearance of the fever and the increased leukocyte count, and the rapid increase in weight are all due to the same cause—*i. e.*, the removal of a rapidly breaking down malignant tumor which was producing a severe toxemia due to the absorption of the toxin from the degenerating neoplasm.

STONE IN THE CYSTIC DUCT

Summary: Interesting problem in diagnosis furnished by a patient giving a history of repeated gall-stone colic attacks, followed by a period of comparative freedom from attacks and then by a silent jaundice. Cirrhosis of the liver a consideration in the differential diagnosis. Operation reveals stone in the cystic duct. Essential pathology. Discussion of two cases presenting similar clinical pictures.

THE patient I shall operate on this morning is a woman of forty who has been under the observation of Dr. Ralph Brown for several months. She furnishes an interesting problem in diagnosis.

Five or six years ago she had a number of attacks of abdominal pain, coming on at intervals, located in the right upper quadrant of the abdomen, followed by tenderness over the gall-bladder region, which were quite consistent with having been attacks of gall-stone colic. For a number of years, however, she has had none of these attacks. She has not, however, been in very good general health. When she came under Dr. Brown's observation examination showed an enlarged liver and a definitely palpable spleen. She had lost considerable weight. There was the general picture of stomach and colon distress of moderate degree. The x-ray picture showed a shadow about $\frac{2}{3}$ inch in diameter in the region of the gall-bladder. This shadow was confirmed by repeated plates, and from its location and appearances seems, with a good deal of certainty, to be a gall-stone. Within the last two weeks she has developed jaundice. This jaundice, however, has been a silent jaundice and not preceded by any colicky attacks. You will remember, however, that I have already said that four or five years ago she did have definite colicky attacks that might have been due to gall-stone disease. The stools have been clay colored at times. The time coagulation of the blood is well within normal limits being about three minutes. On the whole, she is in fairly good condition and is a fair surgical risk.

The physical examination would rather lead one to make a diagnosis of cirrhosis if it were not for two facts—that she has a

history of having had gall-stone colic attacks, and that she has this definite shadow of what seems to be a gall-stone. I mean by that that the very marked enlargement of the liver, the enlargement of the spleen, and the development of the silent jaundice are more in keeping with infection of the liver with resultant cirrhosis than with a cirrhosis due to obstruction of the common duct.

Dr. Brown and I have discussed the case in all of its phases, and feel that it will be wise for us to make an exploratory operation, and if conditions are found that can be removed and the patient cured, this, of course, is to be done. One cannot exclude in a case of this kind the thought of a possible carcinoma.

The patient is now prepared for operation. We might do this operation under local anesthesia, but it seems to me wisest, as there are no contraindications, to do it under drop ether. I am making a large S-shaped incision through the right rectus (Fig. 346, 1). As I open the peritoneal cavity I find no free fluid, although physical examination of the abdomen made me suspect that we might find a small amount of fluid. The liver is very large and extends a handbreadth below the costal arch (Fig. 346, 1), is nodular, and presents the appearance of being separated by new connective tissue into a number of irregular nodular masses. There is no evidence of carcinoma or syphilis of the liver. The gall-bladder is fairly normal in appearance, long, flabby, and a bit opaque, and the walls are slightly thickened. Introducing my hand along the gall-bladder I find in the neck of the gall-bladder or in the cystic duct a stone of the size shown in the x-ray. It is quite evident that the shadow found in the x-ray is the stone which I now feel. I cannot feel any stone in the common duct. Examining the pancreas, I find it thickened, evidently a chronic interstitial pancreatitis, very definite, and very marked. I do not believe, however, that there is much probability that this enlargement is carcinoma. The spleen is enlarged and extends well below the costal arch and can be easily felt on the left side of the abdomen (Fig. 346, 1). There is no evidence of any lesion of the stomach or duodenum or of the intestine. As I examine the gall-bladder I find that with a

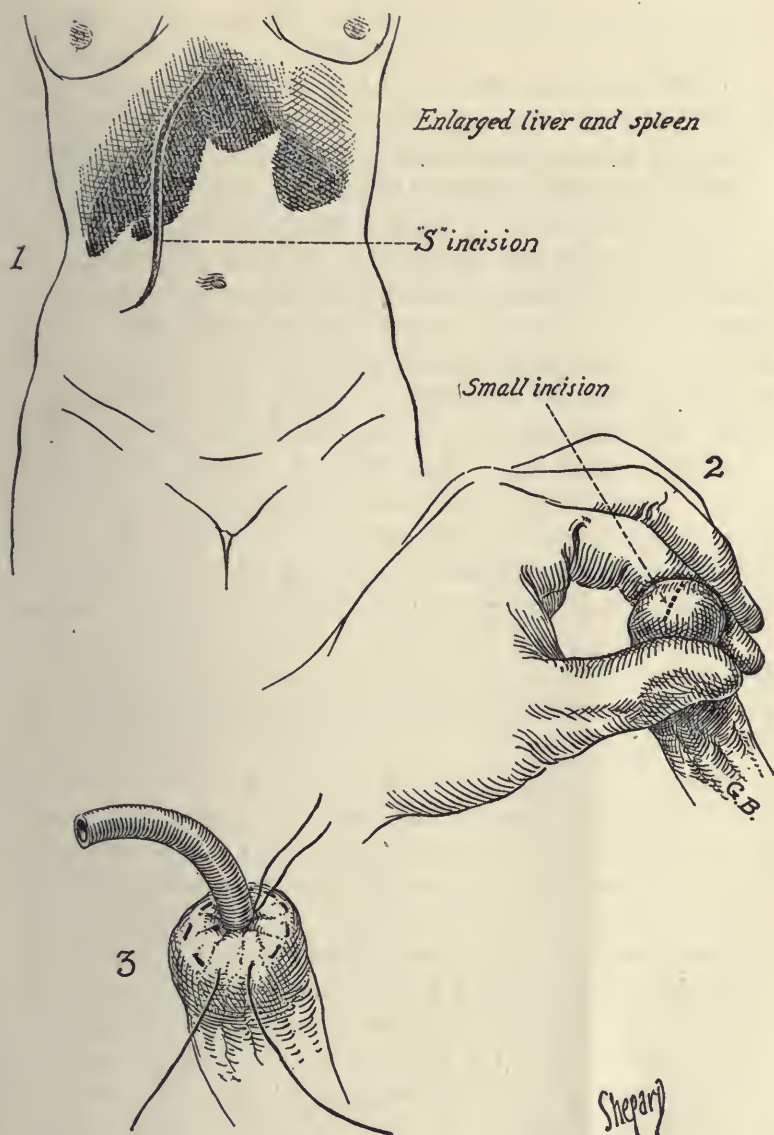


Fig. 346.—1, Diagrammatic sketch showing enlarged liver and spleen and the S incision employed at operation. 2, Incision in fundus of gall-bladder through which stone is removed. 3, Drainage-tube inserted into gall-bladder and secured by purse-string sutures.

little force I can move the stone back from the little pocket it occupies in the neck of the gall-bladder or cystic duct into the gall-bladder proper. I think, on the whole, good surgical judgment would indicate doing a cholecystotomy, removing the stone, and draining the gall-bladder, rather than doing a cholecystectomy with hepaticus drainage. We can, as you see, very easily hold the fundus of the gall-bladder up with two curved forceps and wall the gall-bladder off with abdominal pads. Holding the small stone in the fundus with my thumb and index-finger of the left hand I make a small incision (Fig. 346, 2) through the gall-bladder wall directly down to the stone and push the stone out of the gall-bladder. This is followed by a flow of rather dark tarry bile. After removing the stone I introduce a good-sized rubber tube, about as large as a No. 16 American catheter, into the gall-bladder and stitch it in position with two purse-string sutures of catgut (Fig. 346, 3). There is one unusual feature about this case, that is, you notice the gall-bladder with the tube projecting from it occupies an unusual position well below the costal arch, about midway between the costal arch and umbilicus. In the ordinary case of draining the gall-bladder the gall-bladder is situated very close to the upper end of the incision. Here it is 3 or 4 inches lower than the usual position. The abdominal wall is closed in the usual way.

To my mind this case furnishes a good deal of food for thought and for speculation. To review briefly what we have found, we have here a woman of forty who four or five years ago had gall-stone colic attacks, then was fairly well, then presents herself with the picture of loss of weight, rather vague abdominal distress, with the gradual and marked enlargement of the liver and spleen, and later the development of a silent jaundice, with an x-ray picture showing the presence of a single gall-stone. Laparotomy shows that the stone is not in the common duct, but in the neck of the gall-bladder. What is the essential pathology of the case and what is the most probable interpretation of this sequence of events? In answer to that question I can simply give you my own impressions. They are these: That the primary lesion is a cholelithiasis or gall-stone disease, that secondary

to the gall-stone disease the woman has had a chronic infection of the bile tracts, and secondary to the chronic infection of the bile tracts a chronic interstitial pancreatitis and a chronic infection of the liver and spleen, that these three lesions, the pancreas, spleen, and liver, probably have gone along hand in hand, and finally the chronic interstitial pancreatitis has reached a point sufficient to produce obstruction of the common duct with obstructive jaundice. If this explanation is correct we have, I believe, a very fair chance of curing the patient by removal of the stone and by gall-bladder drainage. One must admit several other possibilities; at least two present themselves to my mind, that the woman has a chronic infection of the liver with resultant cirrhosis and with resulting enlargement of the spleen, independent of the single gall-stone which we have removed, and that this may be simply an incident of little importance. Another possibility is that we have to deal with a carcinoma of the pancreas, which I believe, however, is simply a remote possibility, with an associated infection of the liver and spleen.

This case reminds me very much of a case which I recently had with my colleagues, Dr. James B. Herrick and Dr. Charles Herbert Parkes. The patient, a man of sixty-two, was seen first by Dr. Parkes. The only history that could be obtained was one of repeated chills and fever simulating malaria. For a time there were no other pieces of evidence upon which to hang a diagnosis. I saw the patient with Dr. Herrick and Dr. Parkes in consultation, and I thought of the possibility of a septic thrombus, possibly a septic thrombus of the portal vein from some unknown cause, the possibility of malaria having been gone into carefully and no organism having been found and, in spite of that fact, he had been given the benefit of a very thorough course of quinin treatment. After an illness of five or six weeks he began to be jaundiced. The patient would never admit that he ever had any pain. He stated on repeated cross-examinations that at times he had a sense of discomfort in the upper abdomen, relieved somewhat by belching, and yet I could not help but feel that he belittled the character of these spells, and finally in

talking with him he referred to these spells as attacks lasting for an hour or two. Pinning him down, however, very closely he refused to admit that they were attacks of pain. I believe, however, that there was a mental attitude on the part of the patient to belittle the character of the attacks, as he was very loathe to undergo any operation. A short time after the development of the jaundice at a second consultation I could feel the distended gall-bladder. The man had lost a great deal of weight and the question of diagnosis in the case swung between obstruction of the common duct by stone and carcinoma. The possibility of syphilis of the liver was carefully considered. A Wassermann was obtained and it was negative, the patient denying any possibility of any syphilitic lesion.

On the advice of the two other consultants and myself the patient finally agreed to an operation. He was operated on very much as we did in this case this morning. I came down to a distended gall-bladder containing bile, and on careful examination of the common duct I could find a stone about as large as an olive pit. This was quite freely movable. It could be felt and then would slip from under the fingers and be lost for a time. When we opened the peritoneal cavity we found some free fluid which distressed me very much, because I thought, of course, of the probability of carcinoma. In that case I removed the gall-bladder which was greatly distended, opened the common duct, and removed the stone with a gall-stone forceps. The stone was an oval one, not faceted, and very soft, almost like putty. I passed a probe from the common duct into the duodenum to make sure that the common duct was patulous and put a good-sized tube into the common duct for drainage, introduced a cigarette drain down to the stump of the gall-bladder, and placed a piece of iodoform gauze over the raw surface of the liver from which the gall-bladder was removed, as there was a little continuous oozing from the surface.

Opening the gall-bladder in that case I found a small stone in the cystic duct and was glad on that account that we had done a cholecystectomy. The pancreas was enlarged, very much as in the case this morning. The man had a very stormy con-

valescence. He did very well for three or four days and then had almost complete suppression of urine for forty-eight hours. Finally, under subcutaneous salt solution injections, he improved and went on to a good recovery. I have kept track of the case, and in the last few months he has improved very greatly and regained his former rather rugged health, showing that, beyond question, there is no carcinomatous element in the case, and yet from the gross clinical picture with the silent jaundice, distended gall-bladder, and free fluid in the peritoneal cavity found at operation the chances seem to be very much in favor of carcinoma as the basic disease.

Yesterday afternoon a colleague of mine brought me his brother, a Catholic priest, with much the same picture that we have found in these two cases—rather vague abdominal distress coming on at intervals, forming what the patient calls attacks of distress but not of pain, loss of weight and strength, enlargement of the liver, and a definitely palpable and enlarged gall-bladder. During the last two weeks he has had jaundice, coming on, however, as a silent jaundice. He gives no history of chills or fever.

After examining him carefully I want to tell you what I said to his doctor brother. I said that I felt that the chances were 8 or 9 out of 10 that he had a cancer, that, on the other hand, I had found just such a clinical picture due to gall-stone disease, and had been able to cure the patient by proper surgical intervention. I felt, therefore, very strongly that we owed it to the patient as a duty to give him the chance afforded by an exploratory operation. I would urge you to take the same attitude in handling your own cases. I dislike very much to do unnecessary exploratory operations. On the other hand, I would rather do a number of unnecessary exploratories rather than allow a patient to die without the benefit of proper surgical therapy for some condition that could be removed, such as gall-stone disease. And then, too, not infrequently in incurable cases drainage of the gall-bladder or a cholecystenterostomy as palliative operations may afford the patient great relief, especially from the distressing itching that is associated with jaundice in these cases.

STONE IN THE KIDNEY: REMOVAL BY PYELOTOMY

Summary: Patient presenting clinical and roentgenologic evidence of stone in the pelvis of the kidney. Technic of removal. Discussion of a second case in which the stone could not be located at operation. Necessity of developing a technic by which a pyelotomy can be done with the kidney *in situ*.

THE patient I shall operate on this morning is a young man of twenty-five who comes with the history of having had a number of attacks of renal colic on the right side. He has seen several physicians, and has had two sets of x-ray plates taken at different times, all of them showing the presence of a stone about as large as a small cherry apparently in the position of the pelvis of the right kidney. x-Ray examination of the left kidney and of both ureters and bladder failed to show evidence of any concretions. We have made it a rule in this clinic to give stones not larger than a coffee berry an opportunity of passing out through the ureters and bladder unless there is some threatening complication. This stone is considerably larger than a coffee berry, being three or four times the size of an ordinary coffee berry. Because of that fact I have told the patient that it would be wiser and would, in fact, be safer for him to at once have a pyelotomy done and have the stone removed than it would be to wait for the possible passage of the stone through the natural routes.

The young man's general condition is excellent. There is no contraindication in any way to ether anesthesia, so we shall select drop ether as the anesthetic in the case. You will notice that the boy is a large, muscular fellow, rather short coupled, square built, with not much space between the last rib and the crest of the ilium, and with quite thick, muscular abdominal walls. In operating on these cases I like to have three assistants and have the patient placed on the sound side on the table on a good-sized pillow under the pelvis so as to increase the space between the last rib and the crest of the ilium (Fig. 347). I



Fig. 347.—Technic of removal of stone in the pelvis of the kidney. The work is facilitated by having three assistants. Note the small incision in the pelvis through which the stone is removed.

have one of the assistants hold the limb on the side to be operated on so that the leg is at a right angle to the thigh and the thigh at a right angle to the body, and then elevate the knee off the table so that it is 12 or 15 inches above the other knee. This rotation of the pelvis also increases the space between the last rib and the crest of the ilium. I have learned to prefer this method of increasing the space between the rib and the ilium to the operating tables that are on the market with an attachment for kidney work, the purpose of which is to elevate the pelvis by a broad metal strip which can be raised or lowered by a ratchet, so as to separate the rib and the ilium on the operated side.

The patient is now anesthetized and I make a long oblique kidney cut extending from the angle between the last rib and erector spinæ muscle obliquely downward and outward a finger-breadth above the crest of the ilium. This cut divides the skin and superficial fascia and the latissimus dorsi muscle and exposes the iliohypogastric nerve which we attempt to avoid. The incision is carried forward, going through the external oblique muscle at its posterior border and the layers of lumbar fascia which extend from the erector spinæ and quadratus lumborum muscles forward to the flat muscles of the abdomen. I now come down to the fatty capsule surrounding the kidney. I find that I have not sufficient space, so I continue my incision downward and outward parallel with the crest of the ilium until I have an incision 9 or 10 inches in length. I can now introduce my hand freely into the retroperitoneal space in which the kidney is situated, and by blunt dissection with the gloved finger I separate the fatty capsule from the fibrous capsule of the kidney throughout its entire extent. I find, however, that we have a very short pedicle. By that I mean the vessels of the kidney which I have to deal with. I cannot without using an undue and dangerous amount of force bring the kidney out on the surface through the external incision. I find, too, that the twelfth rib encroaches very much upon my operative field. Without any hesitation I grasp the twelfth rib firmly with my right hand and pull upward, fracturing the rib at the neck, and en-

abling me to elevate the upper part of the incision I think fully another inch, giving me a very much better exposure of the kidney. Even with this increased exposure I find it impossible to deliver the kidney. In most of my kidney operations where I do either a pyelotomy or a nephrolithotomy I am able to bring the kidney outside of the abdomen through the external incision. Occasionally, however, we meet with the same difficulty that we find in this particular case. I need trained assistants in handling this difficult kidney operation, and fortunately my assistants and myself have had some experience with similar cases. I shall have one assistant hold the twelfth rib at the side of the incision well upward and outward, another assistant retract the lower part of the incision, and then with a broad flat retractor, which he can curve to any shape that is necessary, I have my first assistant, Dr. Gatewood, hold down the fatty tissues, muscle, and fatty capsule so that he can in this way expose the posterior surface of the pelvis of the kidney. The kidney, as you will see, is still entirely within the abdomen and it is necessary for me to do this pyelotomy inside of the abdominal cavity.

Holding the kidney in my left hand with my fingers so placed as to push against the anterior surface of the pelvis, I now have my index- and middle fingers against the stone which I can distinctly feel in the pelvis of the kidney. Dr. Gatewood now holds this broad retractor so as to hold all of the tissues away from the pelvis and with the edge of the retractor close against the posterior surface of the pelvis. With a pair of dissecting forceps without teeth I now free the posterior surface of the pelvis of some fat and areolar tissue, doing this in this blunt way so as to avoid injuring any vessel. With the dissecting forceps I can now actually feel the stone, covered now simply by a thin wall of the pelvis of the kidney itself. Taking a short, sharp knife I cut down on the stone, making an incision about $\frac{1}{2}$ inch in length. I then introduce a pair of closed artery forceps in this small incision in the pelvis (Fig. 347), stretching this incision as I open them until I can push the stone out of the pocket. Then with a small pair of gall-stone forceps I lift it out of the

wound. You will see that it is a mulberry calculus with a very roughened surface, about the size of the end of my little finger and too large under almost any circumstances to pass through the ureter even though it were considerably dilated.

What shall we do now with the incision in the pelvis of the kidney? For a time we introduced a few stitches, but the wall of the pelvis is so thin the stitches were of little or no value, and were, in fact, a menace as furnishing a possible nucleus of future stones. Later we put in a stitch or two in the fat covering the pelvis. That, however, we have also discarded. We now simply drop the kidney back in position and carry a cigarette drain to the incision in the pelvis and close the external incision.

This case has been a particularly difficult one, and, as often happens in surgical work, it has not occurred singly. Within the last six weeks we had a very similar experience which did not terminate as fortunately as the case we have operated on this morning. I want to refer to that experience because it was very instructive and was most distressing to both patient and surgeon. It was a case that I operated on before a group of surgeons forming an interurban surgical society. The patient was a large, very thick-set, square-built man, very short coupled, with short neck, large chest, thick abdomen and very massive abdominal muscles, and with very little space between the last rib and the crest of the ilium. The patient had been operated upon for kidney stone some years before. The surgeon who had operated on the case had operated on the left kidney, and had not been able to find the stone and had removed the kidney. Later it developed that the stone had passed down into the left ureter and the x-ray now shows a stone impacted in the lower end of the left ureter just above the bladder.

For some months the patient had been having kidney colics on the right side in the remaining kidney. He was seen by my colleague, Dr. Herrick, who brought him to me, and we both agreed that it was very important to have the stone removed from the solitary right kidney, and I even assured the patient that it could be done without great difficulty.

At the time of the operation I found, as we have found in this case this morning, that it was impossible to deliver the kidney through the external incision. The kidney had undergone compensatory hypertrophy because it was doing double work and were about twice the size of a normal kidney. In addition to that, the build of the patient made this delivery very difficult, and the pedicle of the kidney, that is, the vessels of the kidney, was very short. I could not use any great amount of violence in bringing the kidney to the surface because of the fact that any serious damage to the kidney would almost certainly cause the death of the patient. In that case I did not hesitate to fracture the neck of the twelfth rib so as to increase the space and give me more room for the operation. I could feel the stone in the pelvis at the commencement of the operation without any difficulty, but as I freed the kidney and brought it into view and attempted to do a pyelotomy, as we have done in this case this morning, all of a sudden the stone disappeared and I could not relocate it. I felt in the ureter and could not feel it. I tried to feel it through the thick kidney tissue and could not do this. I tried to manipulate the kidney by gently pressing it to see if I could not bring the stone back into the pelvis, but was unable to do so. I then thought that I would do a nephrolithotomy, and very carefully made an incision through the kidney substance into the pelvis and calices and attempted to locate the stone in that way. I was, however, unable to do so. The operation was prolonged, there was considerable bleeding, and finally I made up my mind to simply introduce a catheter in the pelvis of the kidney and drain, and not do anything further for the time being. I discussed it with the surgeons who were present, one of the men being a recognized authority on genito-urinary surgery, and he agreed with me that under all circumstances it was best to desist from any further effort at removal of the stone at that time.

The patient had a very stormy two or three days following operation. The first day there was almost complete anuria. The second day he passed a small amount of urine, and, fortunately, on the third day he began to pass a fair amount, and then

gradually went on to a good recovery, the distressing feature, however, of the case being that the stone was not removed, and remains as a serious menace, especially because of the fact that he has but this solitary kidney.

I think that that experience and the one that we had this morning emphasize the importance of developing a technic which will enable us to do a pyelotomy with the kidney practically *in situ*, or at least in those cases where it is impossible to bring it out through the external incision. One of the most important things in that technic is the use of a very broad metal retractor in the hands of an assistant who sits on a low stool or chair on the same side of the patient as the operator, holding all the tissues down and out of the way, while the operator holds the kidney in his left hand and incises the pelvis and removes the stone with the right. These difficult pyelotomies with the kidney practically *in situ* demand very wide exposure, and in securing that wide exposure I want to emphasize the importance of fracturing the twelfth rib and pulling it well upward, increasing the operative field in that direction.

CLINIC OF DR. KELLOGG SPEED

PRESBYTERIAN HOSPITAL

TENDON TRANSPLANTATION FOR WRIST-DROP

Summary: A new method of tendon transplantation for wrist-drop resulting from musculospiral paralysis. This method more advantageous than the ones previously devised. Technic.

IN 1916 I described an operation (Surgical Clinics of Chicago, I, 1, 187) for the temporary relief of paralysis of the musculospiral nerve. This consisted of a transplantation of one-half each of the flexor carpi radialis and ulnaris tendons, respectively, into the base of the second and fifth metacarpal bones, while the hand was held in hyperextension. It was intended as a temporary measure to overcome wrist-drop, to prevent the flexor muscles from becoming overstrong, and to prevent also the extensor group from becoming overstretched and losing tone. The indications for this operation were: first, to avoid the constant wearing of a cock-up splint to hold the hand in extension; second, it was intended that when the proper time arrived the nerve could be sutured and return of function in the muscles causing drop-wrist would finally arrive to find the hand and wrist in favorable position and condition for a quick recovery. That operation was devised in France during war service with the British Army and was meant to apply to men with suppurating wounds which precluded an early nerve suture. Where there is an infected wound of either the soft parts or bone and nerve, the time when nerve suture can be attempted is quite remote.

This operation was of use in civil as well as military cases during the two- or three-year interval before nerves could be sutured and regeneration could follow. It did not, however, furnish any extension power for finger-drop.

In 1915 Murphy (Clinics, IV, No. 4, p. 680) published his method of tendon transplantation. He used the flexor carpi radialis alone, inserting it into all the three extensors of the thumb and then into the index and common extensor. The tendon was sutured in a V-shaped manner and was supposed to cause extension of all fingers, depending on the degree of contraction of the muscle. A transplantation into so many tendons must necessarily fail to permit any finer motions and must lack power for the distal tendons (ring and little finger). His illustrations fail to show that this tendon suture was performed with the hand in extreme extension, as it must be to allow for stretching and slacking after the attachment.

Since the publication of these operations there has been much progress in nerve surgery and in tendon transplantation for hopeless nerve injuries. It seems, therefore, that we should all know a suitable operation for overcoming wrist-drop in instances of complete and irremediable severance of the radial or musculospiral nerve. There are cases of both closed and infected open fracture, of prolonged osteomyelitis, or severe gunshot and other lacerating wounds where the musculospiral can never be sutured. For these patients wrist-drop is permanent. The temporary operation which I suggested brings some relief for wrist- and finger-drop. However, there are also more extensive steps which afford greater functional return and which are based on thorough mechanical and anatomic foundations.

When we study the musculospiral nerve from the standpoint of wrist- and finger-drop we find that it branches into the posterior interosseous to supply the extensor carpi radialis brevis, the extensor communis digitorum, the extensor indicis and the three extensors of the thumb, the abductor pollicis longus, extensor brevis pollicis, and the extensor longus pollicis. Consequently, when this nerve is severed near the elbow we have a wrist-drop, an inability to extend hand, fingers, and thumb. There may be some development of other muscles supplied by the median particularly, manipulation of which by re-education seems to overcome partly this paralysis. We do not care to enter into that discussion at this time, but we do wish to arrange

a tendon transplantation using muscles with intact innervation which can be spared from their proper use to substitute for the inactive muscles named.

The hyperflexion of the wrist must be considered as the basis for the disability of wrist-drop. The fingers in that position cannot grasp or otherwise act to full advantage. One cannot make a fist or get but a small proportion of the power of the finger flexors. If we can cause an ankylosis of the wrist, in line with or slightly extended from the forearm, the use of the hand is much greater than if we have a drop-wrist. This presupposes, of course, that the finger motions are free. To ankylose the wrist in such a position it is not necessary to perform an arthrodesis. An artificial ligament on the dorsum of the wrist can be made by a flap of transplanted fascia lata attached to the third and fourth metacarpal bones distally and to the radius and ulna proximally. Following this one transplanted flexor tendon, such as the flexor carpi radialis, as used in Murphy's operation, would give a useful hand. An adjunct donor for the abductor longus pollicis would be found in the transplanted palmaris longus.

There are other possible tendon transplantations, such as the flexor carpi radialis and ulnaris, to the insertion of the extensor carpi radialis and ulnaris, but this leaves the thumb and fingers without tendon donor, as in the temporary operation I have suggested. It is always a question whether attempts at re-education can make the flexor carpi radialis and ulnaris act as extensors. We do not know whether they can become independent of central flexor impulses sent via the median and ulnar nerves, but we do know that the slight extension coupled with the fixation of the wrist in line with the forearm which follows after tendon transplantation permits the fingers to functionate better than in a position of flexion.

In the operation previously described for temporary relief we see the possibilities. The operation now discussed for permanent relief uses the flexor carpi radialis, the flexor carpi ulnaris, and the supinator. The flexor carpi ulnaris, which is innervated by the ulnar nerve, is transplanted into the several tendons of the extensor communis digitorum, especially into the extensor

indicis and also the extensor longus pollicis. The flexor carpi radialis, supplied by the median nerve, is transplanted into the extensor brevis pollicis and the abductor longus pollicis. These two transplantations supply power to extend hand and fingers and also to abduct and extend the thumb. It leads to a balanced hand and to independent full development of thumb motions.

To increase the effectiveness of the transplanted extensor power we call into use a third muscle—the supinator. This muscle arises mainly from the common tendon in front of the lateral epicondyle of the humerus, and is inserted into the rough impression on the posterior and lateral surface of the radius. Its nerve supply comes from the ramus profundus of the musculospiral nerve. Its action is to supinate the forearm by causing the bone to revolve about its long axis. This muscle has considerable power. It is severed from its radial insertion, and its free end is transplanted into the belly of the common extensor while the hand is held in full extension.¹

To recapitulate, the flexor carpi ulnaris, supplied by the ulnar nerve, takes over the work of the extensors, including the thumb. The flexor carpi radialis, supplied by the median nerve, acts vicariously for the extension and abduction of the thumb and the supinator, supplied by the ramus profundus of the musculospiral nerve, takes up the slack of the common extensors' belly, and reinforces their normal action established by the transplantation of the flexor carpi ulnaris at the wrist.

Technic of Operation.—*First Step.*—Starting from just below the external condyle of the humerus while the hand lies in pronation, a long incision is made to the wrist, extending just below the level of the radial styloid (Fig. 348). Skin, superficial fascia, and fat are dissected free slightly on each side.

Second Step.—A split opening is made through the belly of the common extensor near the radius about 3 inches long, starting just below the external humeral condyle, and when this opening is retracted the obliquely directed fibers of the pronator

¹ When the nerve is severed higher up than the origin of the supply to the supinator, the pronator teres supplied by the median nerve may be employed, as in the Jones operation.

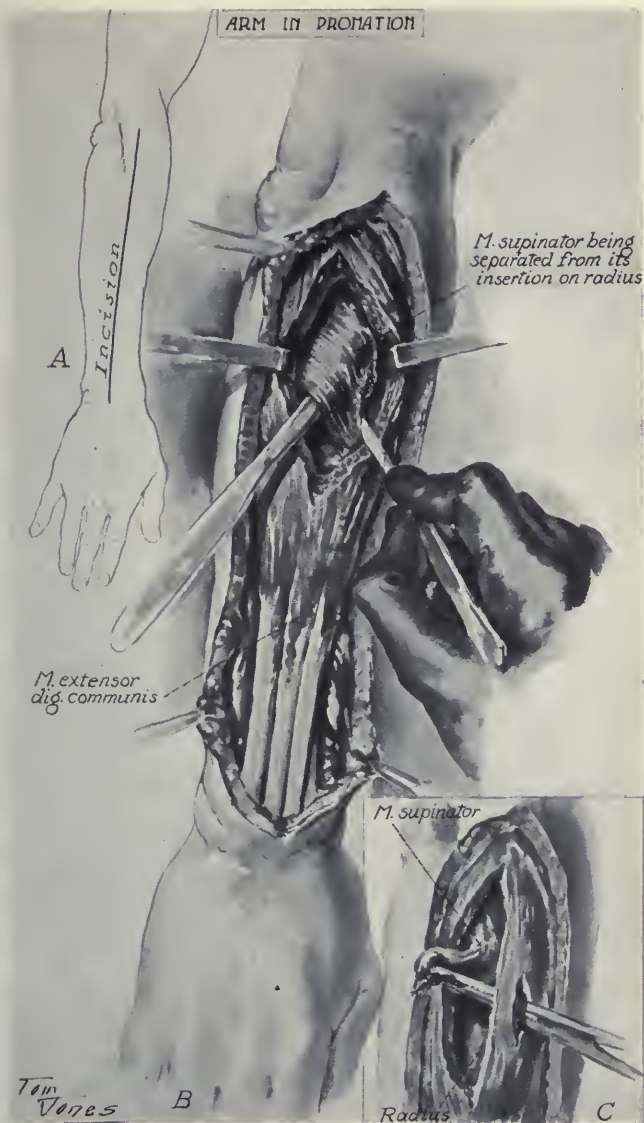


Fig. 348.—A, Incision on dorsum of forearm. B, Forearm opened on the dorsum, extensor muscle belly split and supinator being freed from its insertion into the radius. The long incision is necessary for the tendon work at the wrist and to free the muscles to take up the slack when the suturing is performed. C, Supinator freed from the radius ready to be drawn through extensor bellies by a hemostat when it is sutured later.

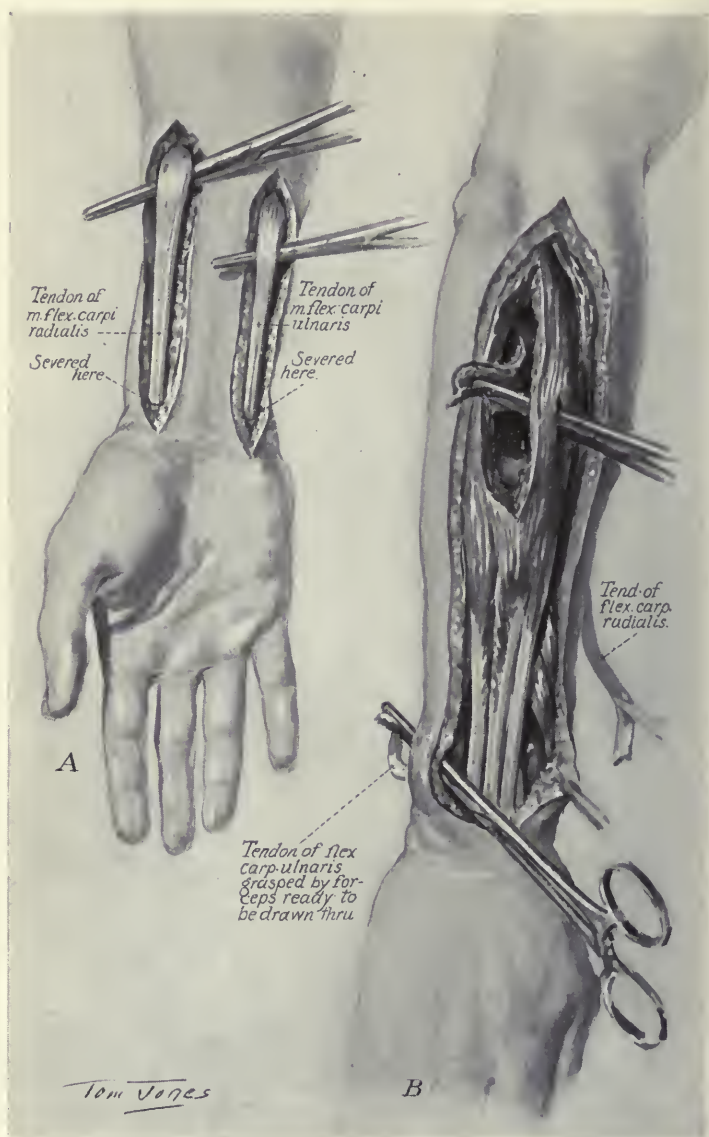


Fig. 349.—A, The flexor tendons exposed well down to their insertions. They are easily drawn through the subcutaneous fat to the dorsum of the hand for insertion as shown in B.

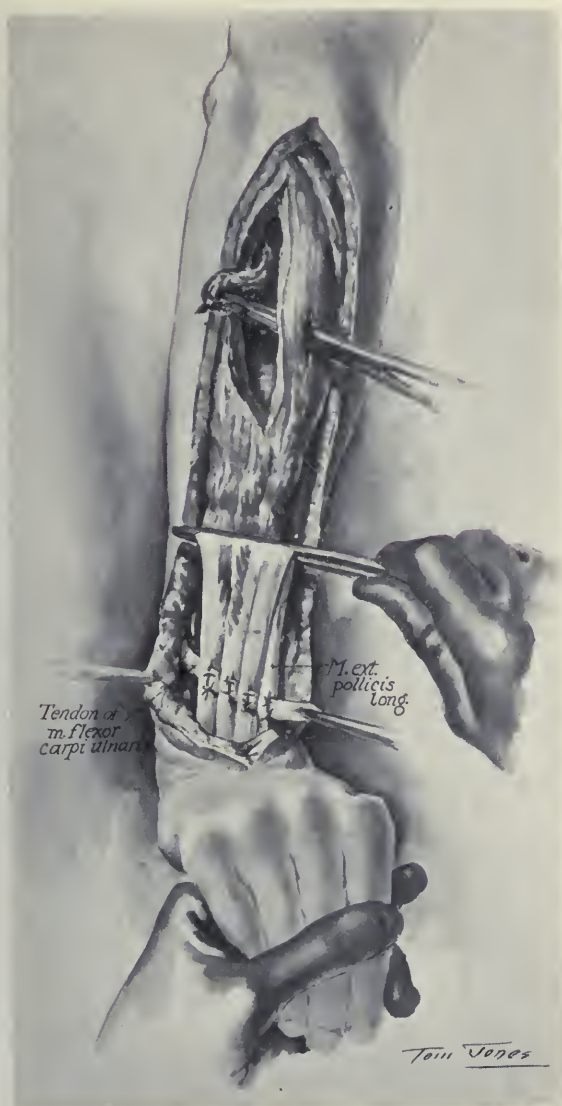


Fig. 350.—The flexor carpi ulnaris inserted into the split extensor tendon group. This tendon is usually redundant. Each extensor tendon must be sutured while held in full extension by the assistant. Note that the supinator has not yet been drawn through for attachment.

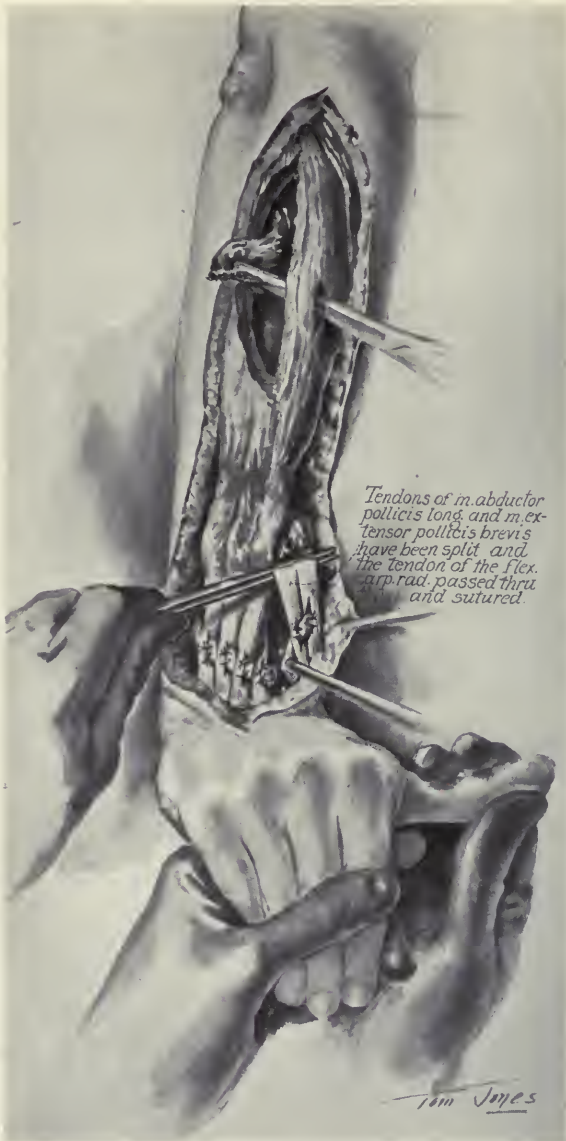


Fig. 351.—Note the slack in the extensor tendons above the point of transplantaion which holds the distal portions taut with the hand in full extension. The flexor carpi radialis is being attached to two of the thumb tendons.



Fig. 352.—While the second assistant makes marked extension on the common extensor belly, the operator pulls the supinator through the opening in the extensor belly, and while holding it taut sutures it to the belly surface. The whole extensor muscle is then taut from elbow to finger ends.

are seen stretching toward their radial insertion. This muscle is gently lifted and freed on a Kocher director and is then severed for its full length at its insertion close to the bone. Lateral to the opening made in the extensor belly a second small opening a little more distal is bored by a Mayo scissors and the divided end of the supinator is drawn through the extensor belly and left attached to a hemostatic forceps.

Third Step.—The hand is supinated. Two incisions are made on the flexor side of the forearm along the radial and ulnar margins, extending from the wrist upward about 3 or 4 inches.

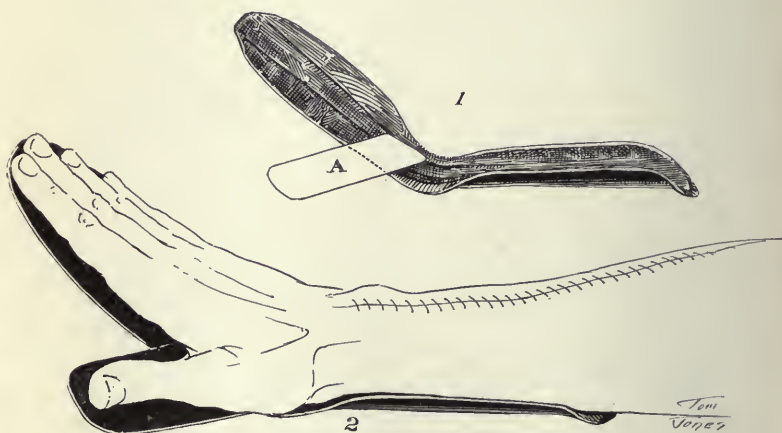


Fig. 353.—1, Diagram showing the cock-up splint with attachment for abducted thumb (A). 2, Hand in extension on the splint. Thumb abducted. Dorsal incision closed.

The radial incision need not be so long as the ulnar. The flexor carpi ulnaris and radialis tendons are quickly and easily identified. They are severed as low down near their insertions as possible and then freed up toward their bellies. The ulnar flexor must be liberated somewhat higher than the radial.

Fourth Step.—The hand is then returned to its pronated position and a tunneling forceps is driven along each outer aspect of the forearm just above the wrist. The two cut off flexor tendons are drawn through to the dorsum of the wrist on their respective sides. The hand is now held by an assistant

in extreme extension and the thumb in abduction. It must remain in this position until the wounds are closed and a cock-up splint is applied. With the hand thus in full extension the tendon slips of the common extensor, the extensor indicis, and extensor longus pollicis are freely exposed, lifted from their bed, and drawn taut. Each tendon slip is split and the ulnar flexor tendon is drawn through and tacked in taut position by linen or catgut stitches. Each tendon must be sutured in order and exact tightness of the distal portion must be maintained. The last tendon is the extensor longus pollicis. Usually there is a superabundant length of the flexor carpi ulnaris tendon, so that a small piece can be amputated after all extensor slips are fastened.

On the radial side the skin-flap is dissected enough so that the extensor brevis pollicis and abductor longus pollicis tendon are brought into view. The thumb is held in abduction and extension, these tendons are pulled taut, split, and the flexor carpi radialis tendon is slipped through them and sutured in this position.

Fifth Step.—With the hand in pronation again the slack common extensor muscle belly is next pulled taut above the opening through which the supinator tendon has been drawn, and under full tension its severed end is sewn on to the extensor belly.

The wounds are closed, and the hand, still in extreme extension, is placed in a cock-up splint *with the thumb abducted*. After two weeks stitches are removed, the splint is taken off for increasing periods each day, but there should be no active attempts at use for five or six weeks. The patient is then urged to re-educate hand and wrist motions. An ultimately excellent functional use is the usual outcome.

CLINIC OF DR. THOMAS J. WATKINS

ST. LUKE'S HOSPITAL

POSTOPERATIVE ATONIC ILEUS

Summary: Postoperative ileus resulting from general muscular atony. Value of intestinal drainage and intravenous injections of glucose in such cases.

THIS case is presented as it has some features which impress me as being of great interest and vast importance. The history is as follows:

Miss G. K., age thirty-six years, was admitted to St. Luke's Hospital April 19, 1920. Her family history was good. She had had the usual childhood diseases and typhoid fever at fourteen years, but otherwise had enjoyed comparatively good health, though never very strong.

Present illness dates from December, 1919. At that time she had a profuse menstrual period which continued for about two months. The loss of blood confined her to bed for most of that time. She also had some nausea and vomiting during that period. Menstruations have been somewhat irregular and profuse since then. In January she had severe pelvic pains which have continued with variable severity since, but not enough to confine her to bed. Her clinical history otherwise was relatively unimportant. She had slight secondary anemia.

The diagnosis was bilateral salpingitis. Operation was made April 20th and the findings were: (1) Left tubo-ovarian abscess about 4 inches in diameter; (2) right salpingitis; (3) uterus retroverted; (4) numerous pelvic adhesions; (5) chronic appendicitis; (6) gall-stones.

Operation: Both tubes and left ovary and body of the uterus were removed; the appendix excised; the gall-stones were removed and the gall-bladder drained. The operation lasted one

hour and fifteen minutes and she was returned to her room in apparently excellent condition.

Recovery was fairly satisfactory for the first four days except for occasional vomiting. There was a slight bowel movement on the second day and free bowel movements on the fifth day. On the sixth day her temperature was 99.4° F. and pulse 80 at 8 A. M. At 4 P. M. the temperature was 102.6° F. and pulse 128. Glucose and soda enemas were started on the third day with the hope of preventing acidosis. She was able to take liquids in moderate amounts from the time of the operation, and on the sixth postoperative day was given selected diet, although there was occasional nausea and vomiting. The slight fever soon disappeared and the pulse remained 100 to 120. Her bowels moved satisfactorily with daily enemas, but considerable abdominal distention persisted.

On the sixteenth postoperative day the distention became suddenly worse. Gastric lavage was made and a small amount of fluid washed out. The following day the stomach was washed out twice and contained considerable fluids; the highest temperature was 103.4° F. and pulse 144. The condition of the patient was serious on account of general weakness. Intravenous infusion of glucose was given on the seventeenth day, with much benefit, and gastric lavage was continued. Numerous ampules of pituitrin were injected, with little or no benefit. In fact, I have failed to ever see very much benefit from the use of pituitrin for distention of the bowel.

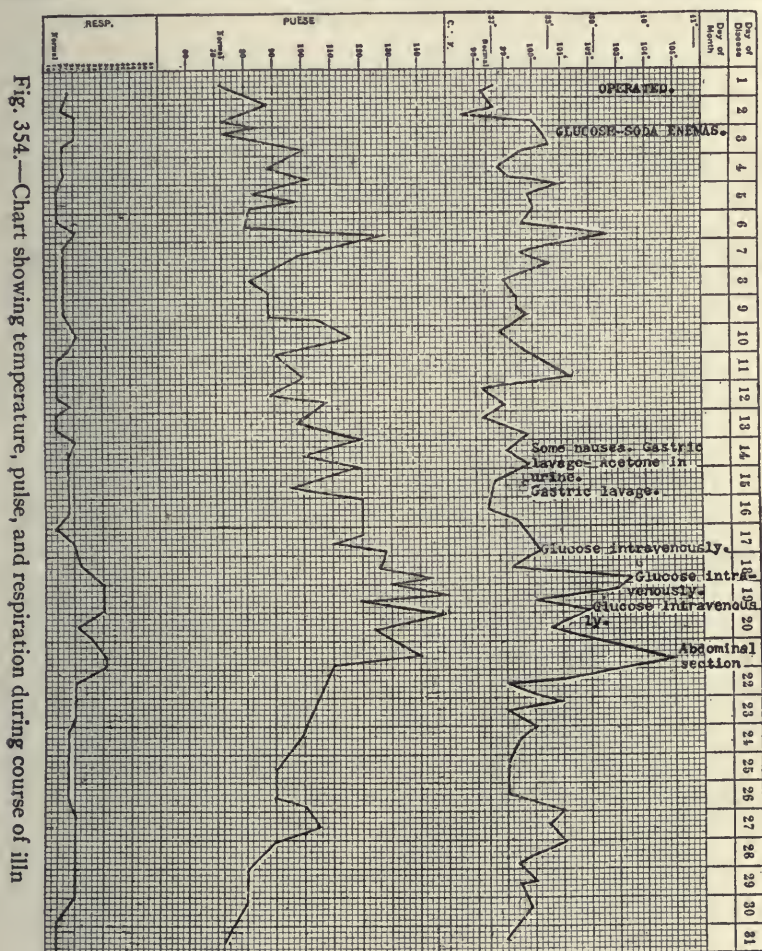
On the twenty-eighth day an abdominal section was made under local anesthesia, with the tentative diagnosis of intestinal adhesions. The findings were only a distended ileum. The entire abdominal cavity was carefully explored and showed entire absence of adhesions. A drainage-tube was inserted into the ileum and retained by purse-string suture.

Following this all the nausea and vomiting disappeared. She was able to take food freely, obtained an abundance of rest and sleep, and went on rapidly to recovery. The intestinal fistula was later closed.

Acetone appeared in the urine on the fourteenth day. Sub-

sequent examinations of the urine failed to reveal the presence of acetone.

Diagnosis.—The cause of the abdominal distention, dilated stomach, nausea, and vomiting makes an extremely interesting



problem. Such postoperative conditions are generally supposed to result from intestinal adhesions following localized peritonitis. The postoperative condition here did not indicate a peritonitis, and the findings on secondary operation excluded peri-

tonitis or intestinal adhesions. The question of acidosis can be excluded, as acetone only appeared in the urine on one day. This case is also important evidence of the value of glucose. Each intravenous administration of glucose was invariably followed by marked general improvement. A study of the case would indicate that without the use of glucose recovery would not have taken place. A review of the history might suggest that the secondary abdominal section should have been made sooner. It would have been of value to her if this had been done. The delay was the result of continued daily hope of an improved condition. The cause of the dilated bowel and stomach and of the consequent nausea and vomiting was undoubtedly a general muscular atony. She was a frail individual who required a prolonged operation, was considerably exhausted by post-anesthetic nausea and vomiting, and unable to take sufficient food by the stomach.

SUMMARY

The specific interesting features in this case are:

1. The occurrence of the dilated stomach and intestines resulting from general muscular atony.
2. The value of instituting intestinal drainage in desperate cases, which can be very easily and rapidly done under local anesthesia. This patient was in such desperate condition when the secondary operation was done that her father, who was a physician, thought it impossible for her to live during the day.
3. The great value of glucose in such cases and especially when given intravenously.

CLINIC OF DR. GOLDER L. McWHORTER

PRESBYTERIAN HOSPITAL

BIRTH FRACTURE OF THE HUMERUS RESET WITH THE AID OF THE FLUOROSCOPE

Summary: Difficulty of reducing fractures and maintaining position in infants.
Importance of the fluoroscope in setting fractures and in making later observations.

THE case of this infant, L. W., is illustrative of the group of birth fractures.

I was called in yesterday to see the fracture which had occurred during the night and had been put up in a temporary splint. The fracture of the humerus occurred in a breech delivery during a rather rapid forcible extraction. The arms were over the head.

The mother is a primipara forty years old.

On examination of the child I found the right arm firmly bandaged in splints. On removing them there was a false point of motion in the middle of the humerus and an overriding with a complete separation of the ends of the fragments. There was some swelling in the region of the fracture, but the ends could be easily palpated. One thing I looked for very carefully was evidence of a radial paralysis. I will discuss this subject again later. There was no evidence of paralysis. The baby moved the hand normally upward and downward.

In setting the fracture I manipulated the ends of the fragments so as to get them in as perfect alinement as possible, afterward bandaging the arm on a board splint placed across the back of the chest so that the humerus was held out laterally to the body. At the lateral end of this splint was another board extending upward for the forearm to rest upon. A child often

lies on its back with both arms in this position, and it has been advised by Ritchie as a good position in which to put the arm with a fracture of the humerus.

After setting the fragments and bandaging them an *x*-ray picture was taken, since they seemed to be in good position. The



Fig. 355.—Roentgenogram before setting fracture under the fluoroscope. The fragments had been carefully approximated without aid of the fluoroscope and the arm is held in splints.

picture (Fig. 355) shows that the ends are not in complete apposition. While undoubtedly a good functional result would occur, yet it is quite simple by the use of the fluoroscope to get the ends exactly in apposition, put the bandage on, and to know that they are held there by subsequent fluoroscopic examinations.

Today I am going to reset the fracture with the aid of the fluoroscope. Few men avail themselves of fluoroscopic aid in setting fractures. I want to emphasize its value and also to mention the very great value of the fluoroscope in removing needles from the hands or soft parts. Frequently these are almost impossible to find. Some time ago in this clinic¹ I described the technic of removing needles from the hand under the fluoroscope.

We will now go into the fluoroscopic room. I will handle the arm very gently after removing the splints and permit as little trauma to the soft parts as possible. Undoubtedly this is of as great value as is immediate immobilization in avoiding nerve paralysis.

By slight bending of the fragments with separation and re-impaction I am able to get the ends accurately approximated. Now putting the arm up again in the overextended position I watch the two ends through the fluoroscope. There seems to be some rotation of the lower fragment, consequently I am abandoning the original splint. I have seen excellent results from the treatment of fractures of the humerus in the overextended position, but I feel satisfied from the fluoroscopic examination that in this case some rotation takes place, although it apparently holds the fragments quite well.

In order to determine the best position in which to immobilize the arm I am moving it about. It seems to me that the best position is with the humerus slightly abducted and the forearm brought in flexed a little more than a right angle and held near the chest (Fig. 356). I will take a freshly folded plaster bandage, which I have in readiness, and fold it along the chest, axilla, and down the whole arm, bringing it out so that the hand will rest upon it. Since this plaster is still soft I am putting an ordinary wooden tongue depressor along the outer side of the humerus to help hold the fragments until the plaster hardens. I now bandage the splints, immobilizing all joints of the arm in this position. Fluoroscopic examination now shows that the fragments are in perfect alinement. Roentgenographic examina-

¹ Surgical Clinics of Chicago, Vol. II, No. 4, p. 787.

tion will be made again in a few days since there may be some change in position.

In discussing birth fractures I want to review a recent book on Birth Fractures and Epiphyseal Dislocations by Truesdell, published by Paul B. Hoeber, New York, 1917. His work undoubtedly deserves great praise, but he makes no mention of the use of the fluoroscope as an aid in the setting and following



Fig. 356.—Roentgenogram of fractured humerus following reduction under the fluoroscope.

up of these fractures. The fluoroscopic examination is of greatest value in setting the fracture, but it is also important where there is difficulty in getting a roentgenogram in two planes after splints have been applied.

Truesdell derived his material almost exclusively from the Lying-in Hospital, New York, during a period of six years. He states that the humerus is the bone most frequently broken during delivery. However, some fractures of the clavicle may

escape notice, and for this reason the two injuries cannot be compared. There were 39 fractures of the humerus in 37 infants. These were incidental to more than 33,000 deliveries; 24 of these were produced during breech extraction, as in my case; 7 were attributed to difficulty with the arms at the pelvic outlet in vertex presentations, while in 2 cases the cause was not determined.

The site of the fracture was invariably at or near the center of the shaft below the insertion of the deltoid muscle. The line of fracture was transverse in all cases but one, and the fracture was complete in all cases. Contrary to popular opinion, there were no greenstick fractures of any bones discovered at birth. There were two types of deformity seen in fractures of the humerus: one, a sharp outward angulation of the fragments, and the second (infrequent), a lateral displacement without angulation, the fragments parallel, but separated. He does not mention a combination of these, although the weight of the arm and traction of the muscles, especially the deltoid, would seem to me to produce an unstable deformity unless immobilized by splints. The angulation, Truesdell states, is more commonly seen in the anteroposterior view than in the lateral view. Overriding of fragments in the humerus was unusual, as compared with fractures of the femur.

One interesting observation in this case, which differs from those of Truesdell, is that there is no evidence of a radial nerve paralysis. Truesdell states that in every case there was noted some degree of radial nerve paralysis, indicated by a distinct wrist-drop. This was present from the time of delivery, and so could not, he thinks, be due to pressure of extravasated blood or, of course, callous formation. The paralysis cleared up in all cases usually in a few weeks.

A dangling arm in the newborn, according to Truesdell, may be due to six common causes. These are: fracture of either the clavicle or humerus; dislocation of either the upper or lower humeral epiphysis; Erb's birth paralysis, and an active syphilis in the form of a specific periostitis, readily shown upon the Roentgen plate.

In the treatment of fractures of the humerus Truesdell recommends, in the fresh fractures, putting them up without splint of any sort. A square of gauze is placed in the axilla and under the forearm and the arm is pressed firmly against the chest wall, after manipulation, if necessary, to correct deformity and the forearm placed across the chest toward the shoulder of the uninjured side. A wide swathe of adhesive plaster is attached around the humerus and entire chest. The fractured arm is thus splinted against the chest. A Velpeau bandage is applied over the adhesive. The arm is roentgenographed through the dressing. The gauze bandage should be removed every day or two and the adhesive probably twice during the three weeks the bandage is worn until union is firm. Usually callus is shown in the roentgenogram about the eighth or twelfth day.

There were no instances of non-union in birth fractures of any of the bones.

A most important observation of Truesdell applies to prognosis as to deformity. This was determined partly by following up fractures of the long bones and partly after dislocations of the epiphyses of the long bones. In fractures of the humerus it was at first supposed that an angulation deformity would become exaggerated during childhood, since a bone angulated at its center and lengthening by growth at its extremities might display a constantly increasing departure from normal as it approached adult dimensions. Truesdell's observations show a progressive elimination of the deformity following birth fracture of the humerus. Deformities of the femur, however, were found to persist. The usual deformity, as frequently seen in adults, is flexion of the upper fragment and a tendency also to external angulation with more or less overriding of the fragments. Consequently, a lateral view is the most important in determining the presence of a deformity. It might be mentioned that Truesdell found that the best results in treatment of fracture of the femur were obtained by placing the infant in a small box with an upright board at the lower end. This board has an inclination of 10 to 15 degrees so as to flex the thigh slightly more than a right angle. The upright is also inclined laterally to a

corresponding degree to afford abduction of the thigh. This may be summed up as a mobile vertical extension.

The explanation of the disappearance of the angulation deformity is more apparent from the observations on dislocation of the epiphysis of the long bones.

Following unreduced dislocation of the lower epiphysis of the femur Truesdell observed by serial roentgenograms that callus was thrown out extending from the newly located epiphysis up along the shaft of the femur. This callus gradually merged into the shaft about halfway up the femur. This new shaft, he thinks, is formed beneath the stripped-up periosteum and including a portion of the original shaft, the superfluous part of the latter being absorbed. Following separation of the lower femoral epiphysis the shaft and also new femoral condyles have been found to re-form in their normal relation to the epiphysis. Absorption of the old superfluous bone takes place more slowly with a beveling off of the protruding part of the diaphysis. In this way the displaced epiphysis will be reinstated in its normal position at the lower extremity of the shaft of the long bones. He observed that this change occurred also in the humerus. It seems to me that these observations are very valuable. The exact changes taking place may be open to academic discussion, but the results obtained are evidenced by serial roentgenograms.

The question of stripping-up of the periosteum seems to me to be highly theoretic. I think that it is possible for reconstruction of the shaft to occur without this complete stripping away.

As the ribs develop *in utero* by a deposit of new bone on one side and absorption on the other, it would seem that they were following certain physiologic principles of developing along lines of resistance. Certainly the younger the epiphysis and the bone, the greater the possibility of a perfect alinement following fractures of long bones as well as following the separation of the epiphysis with failure of replacement. This would explain the failure of growth correction of the deformity in older people where periosteal stripping away may be definitely shown to occur.



Fig. 357.—The arm is held in position by means of a molded plaster cast splint. A short splint is also placed laterally to help retain the fragments.

After-history.—Later examinations showed accurate approximation of the ends. The roentgenogram could not be taken in the lateral plane, but fluoroscopic examination showed excellent alinement, although a slight angulation had occurred. This angulation is slightly anterior and not the usual lateral angulation found by Truesdell. The lateral view would be necessary to reveal the slight angulation. The anteroposterior roentgenogram (Fig. 357) shows a very perfect alinement. The usual deformity is a lateral angulation due to the deltoid muscle abducting the upper fragment. This deformity would show on an anteroposterior roentgenogram. The splints were removed at the end of three weeks. Union was firm. The child used the arm normally by the end of a week, four weeks after the fracture.

CLINIC OF DR. ALLEN B. KANAVEL

WESLEY MEMORIAL HOSPITAL

THE AFTER-TREATMENT OF INFECTIONS OF THE HAND

Summary: The most valuable asset of the working man is his hand. In infections of the hand it is the surgeon's duty not only to control the infection, but to see that proper and adequate after-treatment is carried out. The first consideration in the operative treatment of infections of the hand is to make incisions in the proper locations and of sufficient size to evacuate the pus; of equal importance in the restoration of function is the after-treatment, which involves the use of active and passive motion, of hot baths, dry heat, massage, of suitable splints, and other mechanical aids.

It is my purpose today to present 3 patients who have suffered from infections of the hand and to discuss with you the after-treatment in such cases. One of these is a patient who came to us five days after the development of an infection of the tendon sheaths of the thumb and little finger, which rapidly involved the ulnar and radial bursæ and was followed by the formation of a secondary abscess in the forearm. He was operated upon and after-treatment immediately instituted, with the result that he is now able to fully extend and flex all the digits except the little finger. He has no limitation of motion at the wrist, and except for some slight limitation of extension of the little finger, which does not incapacitate him in the least, he has regained the complete function of the hand.

The second patient is one who suffered from a severe infection of a similar nature, which was treated by inadequate incisions and, as it seems to me, without adequate care after operation. He came to us about a year after the infection with extensive adhesions and contractures (Fig. 360, 1) in the hope that something might be done in an operative way toward restoring the function of the hand.

The third patient is suffering from a similar trouble which, however, has not involved the entire hand.

The history of these three cases is as follows:

CASE I.—This patient is forty-seven years of age and a janitor by occupation. Two months ago he scratched the palmar surface of his left thumb with a pair of pincers and sustained a



Fig. 358.—Case I. Condition of hand two months after operation.

slight laceration of the skin over the distal phalanx. A few days later the thumb became red and swollen, and within five days the swelling involved the palm of the hand, the wrist, and the lower two-thirds of the forearm.

Before entering the hospital he was attended by three different doctors, two of whom made small incisions in the thumb without relieving the pain or swelling.

Upon admission to the hospital his temperature was 102.2° F., his pulse 96, and he appeared profoundly septic. The left hand and forearm were swollen to twice their normal size, were red and tender. Over the palmar surface of the thumb were several small incisions from which thin pus exuded. The tissues were



Fig. 359.—Case II. Condition of hand before operation. The illustrations represent the limits of flexion and extension.

particularly tense about the anterior annular ligament; on the palmar surface of the wrist were several small vesicles. The points of greatest tenderness, just as in similar cases which I have demonstrated to you, outlined very definitely the radial and ulnar bursæ.

He was operated upon within an hour after admission to the hospital according to the methods we have discussed in previous clinics, and after operation the entire arm and forearm were wrapped in a voluminous wet dressing. At the end of five days the hand and forearm bath was substituted for the wet dressings.

He made an uneventful recovery and left the hospital with a slight discharge from the operative incisions two weeks later.

CASE II.—This patient is twenty-five years old, and a worker in the steel mills. On August 14th of last year he ran a nail into the distal phalanx of his left thumb. An infection developed which eventually involved the entire hand and forearm. Thirteen incisions were made over both surfaces of the hand and forearm during a period of three months. Drainage from various incisions persisted until December 15th.

You can see for yourself the scars of the numerous incisions on both surfaces of the hand and forearm, the shiny, glossy appearance of the fingers, and the marked limitation of motion of the fingers and thumb (Fig. 359). He has almost complete anesthesia of the palm and fingers in the area supplied by the median nerve.

CASE III.—This patient is thirty-seven years of age and an instructor in chemistry in one of our universities. On October 8th of last year he cut the index-finger of the right hand, near the metacarpophalangeal joint, on a piece of glass tubing. The wound became infected and was lanced on the third day after the accident. On the following day the wound was opened under an anesthetic and drains put in place. The infected area was irrigated with bichlorid solution, and at the end of a month the drains were removed. For a week thereafter the wound seemed to be progressing favorably, when suddenly, overnight, it again became swollen and painful. On November 15th an incision was made from the metacarpophalangeal joint of the index-finger over the thenar eminence to the carpal bones. Through this incision the infected area was again irrigated with bichlorid solution, and thereafter the infection gradually subsided. These

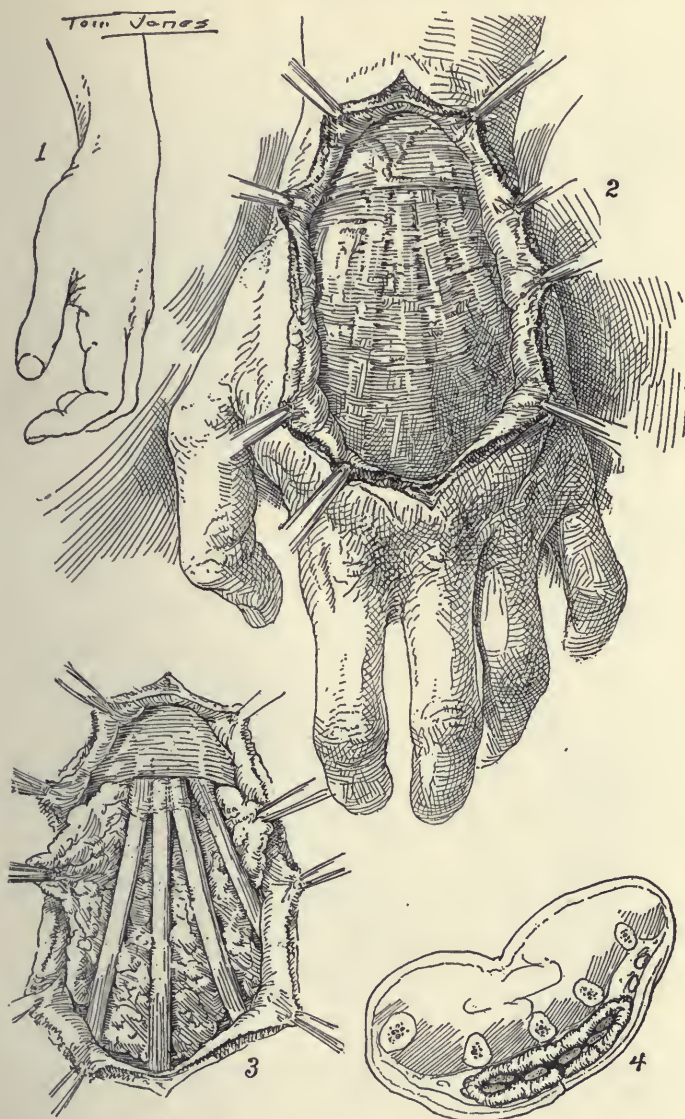


Fig. 360.—Case II. 1, Condition present before operation. 2, Dissection exposing the extensor tendons. 3, Appearance of hand after extensor tendons have been freed from adhesions, a free pad of fat is being placed about the tendons.

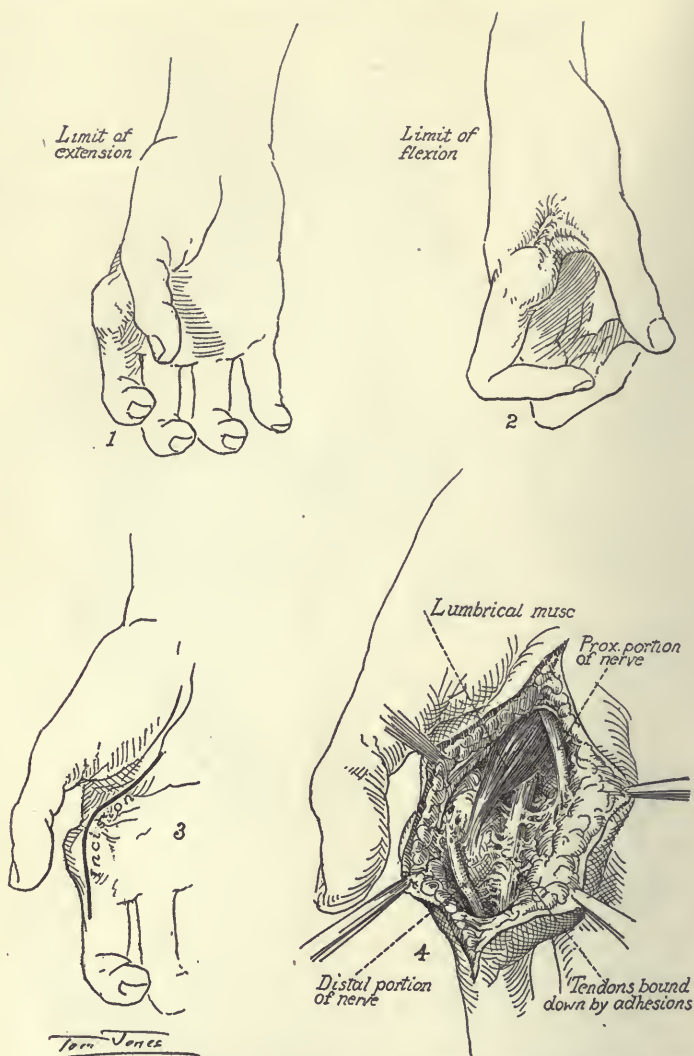


Fig. 361.—Case III. 1, 2, Appearance of hand before operation. 3, Line of incision. 4, Appearance of soft tissues about the metacarpophalangeal joint, showing the involvement of the flexor tendons and digital nerve.

facts are elicited from the history, since the patient was not under our care at that time.

You can see the condition of the hand which has resulted

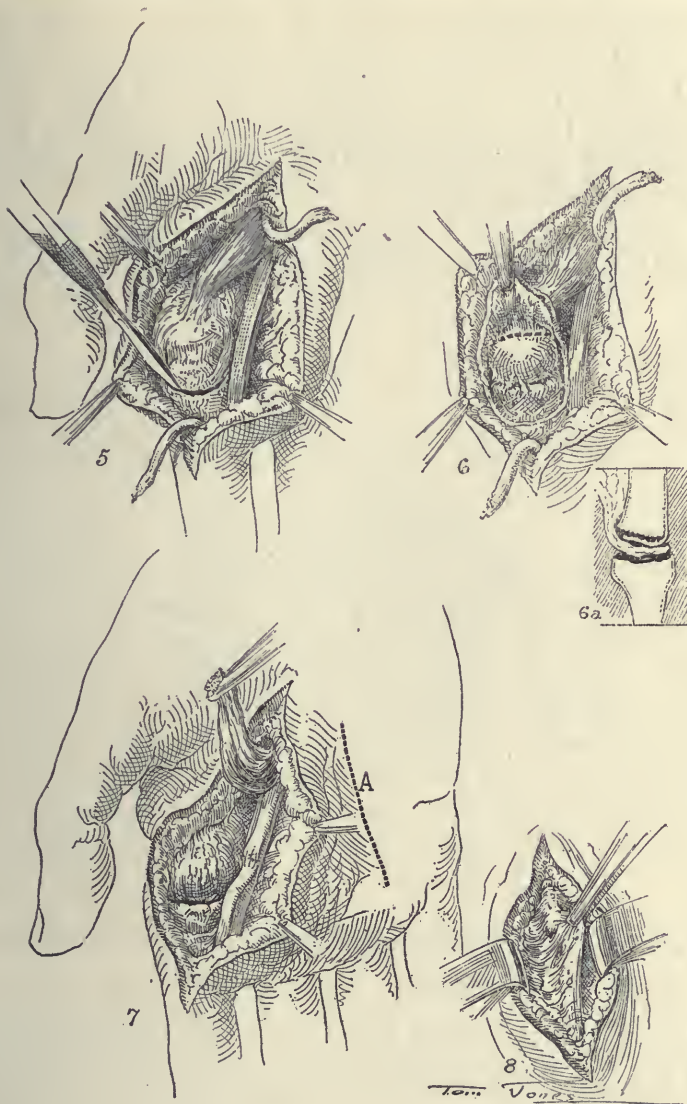


Fig. 362.—Case III (continued). 5, Line of incision through the periosteum of the incision. 6, Resection of the distal portion of the second metacarpal bone, with the insertion of a pedicled flap in the joint cavity. 7, Suture of the digital nerve. The lumbrical muscle is to be sutured to the periosteum on the radial side of the proximal phalanx. 8, Adhesions about the flexor tendons of the middle finger.

from this infection (Fig. 361, 1, 2). There is numbness along the radial border and palmar surface of the index-finger, atrophy of the soft tissues on the radial side of the index-finger, and an ankylosis at the metacarpophalangeal joint. In addition to the involvement of the index-finger there is a marked involvement of the middle and ring fingers.

It is evident that a discussion of the treatment of infected hands includes not only the subject of immediate surgical care,

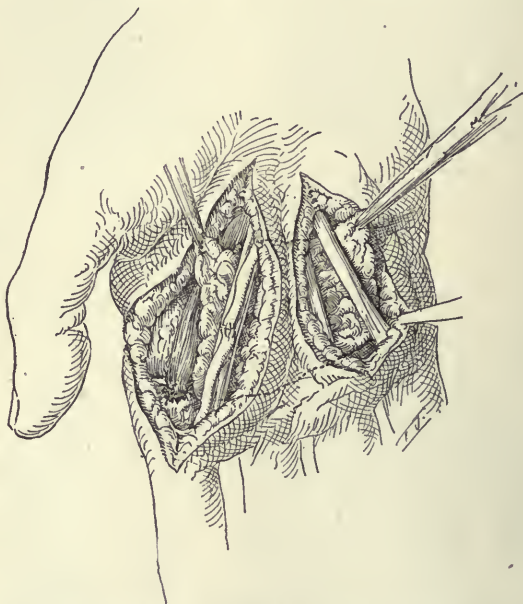


Fig. 363.—The tendons and nerve, freed from adhesions, are surrounded with fat.

but a study of the various forms of treatment after operation. The first part of the question I have discussed with you exhaustively in previous clinics. I believe that you appreciate the fact that no matter what the after-treatment may be, these patients will not secure the best possible function unless correct and adequate incisions are made. On the other hand, considerable experience has taught us that if proper incisions are made reasonably early in any type of infection, whether it be a connective-

tissue abscess or tendon sheath infection, complete function may be restored if proper after-treatment is instituted promptly.

The general principles of treatment after operation consist in the institution of proper drainage, of active and passive motions, the use of hot baths, dry heat, massage, of suitable splints, and of various other mechanical aids for the restoration of function.

Too much stress has been placed by writers upon considerations as to the type of drainage material that should be used. The essential thing is that proper and adequate incisions be made that will permit free evacuation of the pus, and that these incisions be kept widely open for at least forty-eight hours. Ordinarily no drainage material of any kind is necessary. At times its use is indicated, particularly in those cases in which, because of the creases and folds in the hand, there is a tendency for the edges of the incision to become approximated. Some non-absorbable material, such as thin rubber or strips of old rubber gloves, which keeps the wound edges separated, is all that is necessary. Such a drain prevents the pus and coagulated serum from obstructing the wound opening and can be removed without pain. If there is considerable oozing after operation it may be advisable to pack the wound loosely with gauze saturated with vaselin. This can be removed at the end of twenty-four or forty-eight hours with very little pain. If at the end of seventy-two hours the hand does not show marked improvement, it is evident that some pocket has not been drained.

TREATMENT AFTER OPERATION

Passive and Active Motion.—Clinically we recognize two common types of hand infections—those due to the streptococcus, and those due to the staphylococcus and similar organisms. In both types it is of the greatest importance that active and passive motion should be begun as soon as possible after drainage has been instituted. In the staphylococcus infections at the end of thirty-six hours or, at the most, of forty-eight hours the patient should be urged to use his fingers for ten or fifteen minutes two or three times a day—flexing, extending, adducting,

and abducting them—after which the surgeon may carry out passive motion in various directions. If the infection has been due to the streptococcus it may be advisable to delay active and passive motion for twenty-four hours more. If the patient's temperature should rise after manipulation of the hand, passive and active movements should be delayed for another twenty-four hours, and then carried out very gently and through a limited range of motion. The importance of these movements, however, is so great that some risk is justifiable in instituting them. They may ordinarily be done without pain to the patient. If there is pain the forearm and hand may be immersed in a hot bath for ten or fifteen minutes, after which movements can ordinarily be carried out without pain. I cannot insist too strongly upon the necessity of beginning this treatment at the earliest possible moment.

Hot Baths.—After forty-eight or seventy-two hours the arm bath, which is large enough to permit complete immersion of the hand and forearm, may be substituted for the hot dressings used immediately after operation. The entire hand and forearm are kept in the bath for twenty minutes two or three times a day, during which time the patient moves his fingers both by active contraction of the muscles and with the help of the other hand. The water is as warm as can be borne without pain. This procedure relieves the pain, keeps the skin thoroughly cleansed, and produces an increased blood-supply, which helps to combat the infection and at the same time improves the nutrition of the part.

Dry Heat.—At the end of from four to six days it will be found advisable to decrease the interval during which the hand is immersed, and to expose the infected hand immediately after the bath to the rays of an electric light which will thoroughly dry the skin. Healing of the superficial tissues will take place more rapidly, once the infection is under control, if passive congestion is avoided. The warmth of dry heat, just as of moist heat, will help to relieve pain, and make passive and active motion easier. By alternately plunging the hand into baths of hot and cold water for fifteen minutes twice a day it is possible

to produce alternating dilatation and contraction of the blood-vessels, and so improve nutrition by improving the muscular tone of the blood-vessels.

Splints.—If the original incision has been so made that there is a tendency for the tendons to prolapse, it is advisable to apply a dorsal splint during the time that the patient's hand is not being exercised. In no case, however, should these splints be applied and left in position for any considerable period. They should be removed at least two or three times a day in order that the procedures mentioned above may be carried out. At times there is a tendency for extension to take place at the metacarpophalangeal joint with flexion at the interphalangeal joints, because of the involvement of the lumbrical muscles and the nerves which supply them in the infectious process, and, second, because of the involvement of the median and ulnar nerves in the forearm. It may be found advisable to apply splints for a short time in order to prevent this contraction, but it is seldom necessary if early passive and active motion has been instituted. The condition we often see of permanent flexion at the wrist-joint, particularly if associated with adduction or abduction, is due, in my judgment, to the fact that the patient's hands have been bound up for a considerable period of time with dressings, and that no attention has been paid to proper after-treatment.

Mechanical Devices in After-treatment.—Within ten days or two weeks it will be found that the methods outlined above do not adequately meet the problem in these patients. The patient grows tired of active and passive motion, and the surgeon fails to continue the personal supervision that these patients require. In order to maintain the interest of the patient and to ensure a steady progress toward the restoration of function a number of various mechanical devices have been suggested. Whatever method is used, it should be borne in mind that the patient's interest must be aroused so that he will willingly continue the treatment. This may be secured ordinarily by introducing as far as possible the element of competition either with himself or with others.

Among the most valuable devices available are the various types of rollers which the patient rotates so as to raise or lower the weights which may be attached. Those constructed of cylinders of varying sizes are the most effective, since the patient is constantly encouraged to flex his fingers about the



Fig. 364.—Mechanical devices for exercising the fingers and wrist.

smaller cylinders. Another valuable device is a glove so constructed as to hold the fingers in a position which prevents contraction in an improper position, and which permits the patient to grasp objects of different varieties. Such a glove can be made by attaching a leather strip to the back of each finger of the glove and bringing it forward over the tip of the finger

to a buckle on the flexor surface of the glove at the wrist. By this means the fingers may be flexed to any desired degree, so that the patient can grasp the handle of a tennis racquet, an Indian club or golf club, a roller, or other hand apparatus. Still later, by the aid of this glove, the fingers may be flexed so that

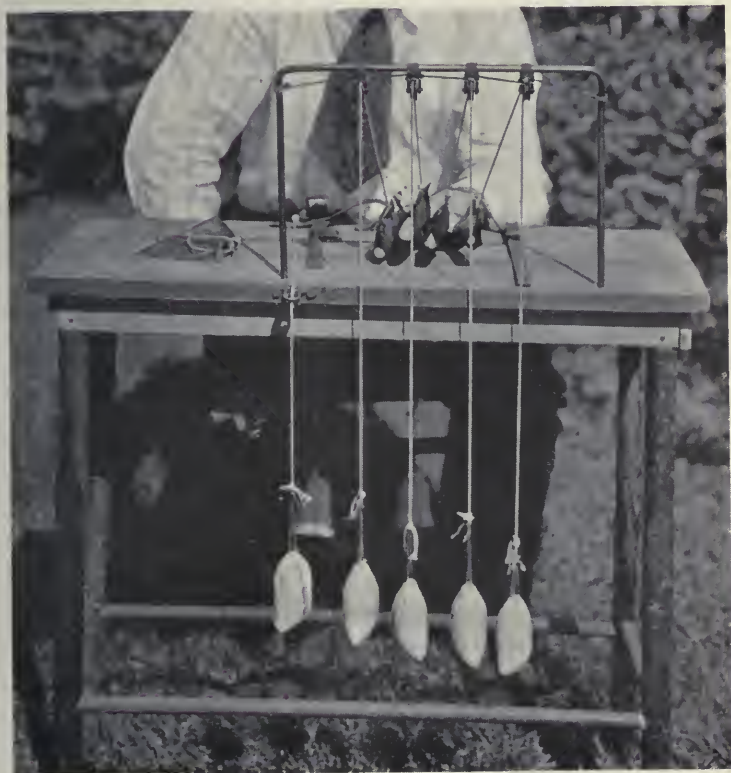


Fig. 365.—Device for exercising the fingers and thumb.

the patient can punch a bag. This is an especially satisfactory form of exercise in the later stages of treatment.

Games and devices that relieve the monotony of routine movements are always helpful. For exercising the fingers, crokinole and practising on the piano or typewriter are particularly valuable. For the fingers and wrist tennis, Indian clubs, hand-

ball, golf, indoor ball, volley ball, and bowling are helpful. At first it may be necessary to strap the hand about the tennis racquet or golf club with the aid of the glove mentioned above. In cases with marked stiffness of the fingers it is frequently a source of wonderment to the patient that he is able to maintain his hold on the club or racquet, and the assurance thus acquired may be the only stimulus needed to keep him at the game. The surgeon should insist that the patient keep at some form of exercise at least an hour each day, dividing the time according to the strength of the part.

The surgeon's interest should not end here. He should remember that the ideal in surgery of the hand is to restore the patient to the occupation to which he is accustomed. The laboring man should be urged early in his treatment to use the shovel, the pick or hoe, or to use the hand in grasping a hammer, an axe, or a wheel-barrow. The musician, the stenographer, the type-setter, the mechanic can all find suitable exercises for helping them to acquire the deftness needed for their particular work. Such exercises should not be carried out in a perfunctory manner, but with the active co-operation of the surgeon, who realizes that by their use complete function may be restored to the patient.

With abscesses in the hand which do not involve the tendons it is possible to secure complete restoration of function inside of a month. Where the tendon sheaths have been involved, if delay in the treatment has occurred, a longer period of time is generally necessary; 85 per cent. of function ought to be secured within four months, 95 per cent. within six months, and in favorable cases 100 per cent. within a year.

In those patients who have involvement of the tendon sheath of the index-finger it will be found that there is some limitation of motion on the part of the middle finger and ring finger. Impaired function of the ring finger, however, is generally not due to adhesions about the tendon sheath, and with proper treatment complete function should be restored very quickly. Function of the middle finger may be impaired by involvement of the lumbrical muscle attached to it, so that restoration of function

may require a longer time. It should respond to treatment, however, even in neglected cases, so that the patient should eventually have full use of the finger. With regard to the index-finger itself, the result will vary as to whether the tendon has prolapsed or whether it has been destroyed by infection. If it is not prolapsed and has not been destroyed, almost complete return of function can be secured. With all of these fingers individual function is likely to be slightly impaired because of the formation of adhesions at the point where the deep flexor tendon passes through the superficial tendon. Such adhesions prevent the proper movement of the distal phalanx. This condition can be obviated only by early and adequate incision, followed by prompt and adequate after-treatment.

Involvement of the tendon sheath of the thumb or little finger, with consequent involvement of the ulnar and radial bursæ and the formation of abscesses in the forearm, would seem to present a much more dubious outlook, but I can assure you from personal experience that the results obtained in this particular type of infection, if incision has been made reasonably early and the methods suggested above followed out, are far beyond what we originally supposed. The first patient whom you saw today had just such an infection; and though he came to us at least five days after the tendon sheaths became involved, he has obtained a complete restoration of function. Such a result can be secured in practically every instance, with the possible exception that full extension of the little finger may at times be lost.

THE STAGE OF ADHESIONS AND CONTRACTURES

We come now to that group of patients who have suffered from infections in the hand which have been improperly treated, and who present themselves with stiff, claw-like fingers and hands, with ankylosis at the joints of the hands and wrist—in short, with an insensitive and an altogether useless member. The difficulties to be met with at times seem almost insurmountable. The median and ulnar nerves are frequently involved in the suppurative process. Scar-tissue contraction has compressed

the nerves in the forearm and involved the filaments which go to supply the small muscles of the hand. At times, owing to the fact that the indifferent surgeon has drawn a rubber tube under the anterior annular ligament and left it in place for some days, the median nerve may be found to be entirely destroyed at this site. In the more complicated cases the tendons at the wrist-joint will be found to be one indistinguishable mass of scar tissue. Some may be entirely lost, while in others scar tissue contraction and atrophy of the muscle-fibers have taken place. Not only must the tendons be restored, but the nerves must be permitted to regain their vitality, and the muscles must be redeveloped. If, in addition, the joints of the fingers and the wrist-joint present a bony or fibrous ankylosis the problem becomes still more complicated.

At times considerable improvement may be secured through the breaking up of adhesions in the joints, followed by active and passive motion carried out persistently with the aid of the various appliances mentioned above. This method should be used judiciously and never carried to the extent of tearing the ligaments or tissues. If this accident occurs, new scar tissue is formed, with the result that the patient is in a worse condition than he was at the outset.

Operative treatment should not be attempted unless the surgeon is fully conversant with the anatomy of the hand, particularly with the distribution of the nerves and the relations of the nerves and tendons. It is wise not to promise a patient any benefit from the operation, for while in no case upon which I have operated have I failed to secure a hand better than it was at the time the patient came to me, yet in no case have I restored a hand to a condition equal to that present before the infection occurred. It is better to promise little and do more than to promise much and do less.

Where the index-, middle, and ring fingers are involved and the tendons have been preserved, I have been able in some instances to secure good functional results, and in 2 cases I have secured a restoration of function in these fingers when there was also a bony ankylosis at the interphalangeal joints. Func-

tion can ordinarily be restored earliest to the fingers adjacent to that most seriously involved; that is to say, if the middle finger has been involved and there is some limitation of motion in the index- and ring fingers, even though complete function may not be restored in the middle finger, yet the freeing of adhesions, the transplantation of fat, and other procedures to be mentioned will result in restoring function in the index- and ring fingers. Where the thumb and little fingers are involved, and there is also an extensive destruction at the wrist-joint, one must be especially careful not to promise marked improvement, because in such cases the muscles and nerves of the hand are extensively involved. Even here at times results far beyond expectations may be obtained. A fibrous ankylosis at the wrist-joint may at times be broken up by operation, and with persistent after-treatment a considerable degree of function may be restored. If there is a bony ankylosis it will be necessary to resect at least $\frac{3}{4}$ inch of bone, and replace it with a pedicled transplant of fat to preserve its mobility.

In the complicated cases it is my custom first to free the tendons on the back of the hand and transplant free pads of fat from the abdominal wall underneath and above the tendons, being careful not to destroy the sensory filaments of the nerves where they are found. Immediately after operation I flex the fingers at the metacarpophalangeal joints and extend them at the interphalangeal joints. The hand is kept in this position for three or four days, except for a few minutes twice a day when it is moved freely. Operation on the palmar surface cannot be performed until later, and if adhesions about the joints are simply broken up and the fingers permitted to return to their previous condition, ankylosis will again take place in an improper position. After the first operation, because the condition of the flexor tendons is still unchanged, extensive active movements cannot be carried out. It is necessary, therefore, at least twice daily to move the fingers through a complete range of movement in every direction—adduction, abduction, and rotation—particularly at the metacarpophalangeal joint.

As soon as the dorsum of the hand is healed sufficiently so

that there is no danger of the wound opening at the site of incision—ordinarily within six weeks or two months—the second operation is performed on the flexor surface. This is much more difficult and tedious. The dissection should always begin on the flexor surface of the forearm, the median and ulnar nerves should be identified, and with magnifying glasses these nerves followed down into the hand to their finest ramifications. I cannot emphasize too strongly the necessity of care in dissecting out these nerves, particularly the motor nerve to the short muscles of the thumb, which comes off from the main branch of the median about a thumb's breadth below the anterior annular ligament.

The anterior annular ligament itself may be cut, and from the mass of scar tissue beneath it tendons may be made; or new tendons may be constructed from free transplants of fascia.

It is not my purpose to discuss with you the entire subject of treatment in these complicated cases, but I wish to draw your attention to the fact that if the patient is willing to undergo two or three operations, and to carry out treatment for a number of months after operation along the lines which we have suggested, the results will surpass one's expectations. Improvement in these cases does not cease at the end of six months or a year, but will continue for four or five years, so that the patient should be considered as under your care for at least this latter period of time. He should meanwhile be inducted into work in which he can use his hand, and should be advised and urged to use it.

The apparatus we have used in these cases is simple in construction, as you can see by examining this table. We have taken an ordinary kitchen table and attached to it the forms of apparatus we have found most valuable, so that the patient may have in compact form for use at his own home the various types of apparatus required.

I would urge you to have in mind constantly that it is your duty as surgeons not alone to make proper incisions and evacuate pus, but to see to it that adequate after-treatment is carried out persistently and intelligently. The hand of the working man is his most valuable asset. Without it life becomes a burden.

CLINIC OF DR. GATEWOOD

PRESBYTERIAN HOSPITAL

ACUTE DIVERTICULITIS OF THE SIGMOID

Summary: Etiology of diverticulitis of the sigmoid. High mortality renders primary radical operation inadvisable in cases complicated by abscess formation. Technic of operation in present case. After-history.

THIS patient is thirty-six years old; married. I first saw her yesterday, when she came to me complaining of acute pain in the abdomen, nausea, and vomiting. Last Sunday, or five days ago, she ate a hearty dinner and two hours later was seized with severe cramps in the abdomen. A little later she vomited several times. She had been in excellent health before this, although she is habitually constipated. Salts were given and several diarrheal stools resulted. Since the onset the patient has eaten but little and the pain has continued. It has been most marked in the lower left quadrant of the abdomen. In addition to the repeated cramp-like pains, which she says resemble gas-pains, there has been a steadily increasing tenderness on the left side, and she thinks she has had considerable fever.

Eight years ago she was operated on for some pelvic condition. According to her brother, who is a physician, the left ovary and tube and appendix were removed at this time. She has never been pregnant. Her last period occurred at the usual time, two weeks ago.

Physical examination reveals a well-nourished woman about the age stated, who is evidently acutely ill. The physical findings are negative except for the abdomen. Here we find an old scar about 5 inches long, evidently the result of a modified McBurney incision. The left rectus is very rigid on palpation, while the right is only slightly so. There is a mass as large as an orange extending mesially and upward from the crest of the

ilium. This is exquisitely tender. There is no tenderness in the region of the left kidney and no rigidity of the lumbar muscles on this side.

Vaginal examination reveals a small, infantile uterus well anteverted. There is no mass to be felt on either side and almost no tenderness. The mass on the left side is too high to be palpated through the vagina.

Her temperature since admission has varied from 100° to 102.2° F. Her leukocyte count yesterday was 16,100 and hemoglobin 80 per cent. (Dare). The urine is negative except for some epithelial cells and an occasional leukocyte.

We are evidently dealing with an abscess in the region of the sigmoid and the diagnosis is not difficult. From the vaginal examination and from the history of an old operation, such a pathologic condition as a strangulated ovarian cyst or pus-tube can be eliminated. The mass is higher than one would expect for almost any pelvic pathology. Extra-uterine pregnancy has been suggested, but the signs point rather to some acute infection, and there have been no symptoms of hemorrhage. I can remember very well a case of pyonephrosis with a displaced kidney which gave much the same picture as we find here. However, in that case there was an antecedent history suggestive either of kidney stone or Dietl's crisis and there was also marked evidence of cystitis. Carcinoma of the sigmoid naturally suggests itself, but I believe we can eliminate it from our consideration. While it is not at all unusual to find malignancy of this portion of the large bowel in a woman of her age, we should expect more in the way of a preceding history, such as increasing constipation, loss of weight, and blood in the stools. Pain frequently is absent in cancer of the bowel until infection complicates the history, so that the absence of preceding pain and tenderness is without much significance. It is often surprising how much obstruction may result from inflammation of very small diverticula, giving symptoms similar to those caused by carcinoma of the large bowel. The x-ray, however, usually makes the diagnosis definite, except in those cases in which both are present. We should have employed it in this case were it

not for the acuteness of the symptoms. Ulcerative colitis and tuberculous colitis hardly need to be mentioned, as the acute onset, combined with temperature and leukocytosis, indicates some trouble of very recent origin. What have we left? Left-sided appendicitis can duplicate the picture we have here, but we are reliably informed that the appendix has been removed. So-called *left-sided appendicitis*, or diverticulitis of the sigmoid, has been frequently reported in recent years and fits our case so well we can make that diagnosis without hesitation.

There is no contraindication to a general anesthetic, so that we shall operate under ether anesthesia. I am making a muscle-splitting incision, similar to the McBurney incision in the lower left quadrant of the abdomen (Fig. 366, 1). I hope to be able to separate the peritoneum from the pelvic wall so that I can drain the abscess, which we are almost sure to find, without opening the peritoneal cavity. I am not at all sure that I can do this because most diverticula of the large intestine develop from the antimesenteric border, and therefore rupture into the peritoneal cavity, and are secondarily walled off. This is in direct contrast to diverticula of the small bowel which rupture at the mesenteric border between the leaves of the mesentery. In that event it will be necessary to open the peritoneum and proceed as in a case of perforative appendicitis. I find that it is impossible to explore this mass without opening the peritoneum. Upon opening the abdominal cavity the sigmoid almost immediately presents. It is indurated, edematous, and the peritoneal surface has lost its luster (Fig. 366, 2). As I attempt to explore I open into an abscess cavity between the sigmoid and the pelvic wall. This does not make our diagnosis absolutely certain, but there is little likelihood of any other lesion giving this picture.

What shall we do further? It has been pretty generally agreed that in diverticulitis with abscess formation no radical operation should be contemplated. I shall, therefore, simply content myself by draining the abscess and closing the wound after inserting two cigarette drains (Fig. 366, 3). The probabilities are that this will be sufficient to produce at least a temporary cure. Whether or not it will be permanent will depend

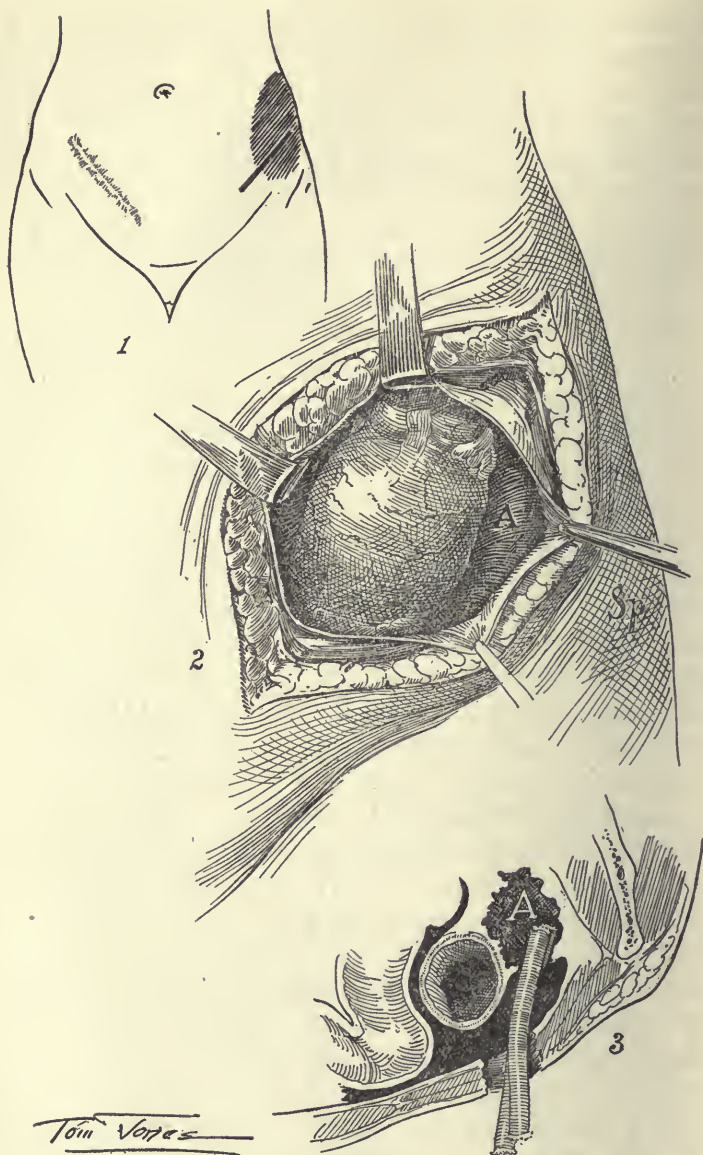


Fig. 366.—Acute diverticulitis of the sigmoid. 1, Muscle-splitting incision in lower left quadrant of the abdomen. 2, Indurated and edematous sigmoid presenting: A, Abscess cavity between the sigmoid and pelvic wall. 3, Two cigarette drains inserted down to abscess.

upon several factors. In the first place, in most of these cases multiple diverticula are present, sometimes hundreds of them beginning at the splenic flexure and extending as far down as the rectum. Most of them, however, occur in the large bowel, and especially in the sigmoid. In the second place, the ultimate prognosis will depend on whether this diverticulum contains a fecal stone or other foreign body which was extruded at the time of perforation. In the event that no foreign material has been left behind, the patient may be entirely cured. If, however, some fecolith or other foreign material is retained within the diverticulum, one may be sure that further trouble will be encountered until the cause has been removed. In the event we had not found an abscess, but simply an acute inflammation comparable to acute gangrenous appendicitis, we might have considered a radical operation, which would mean that all the diverticulum-bearing area should be resected. This operation carries with it considerable mortality because anastomoses in this portion of the bowel not infrequently leak and because technically it is often difficult to make a lateral anastomosis with the rectosigmoid after resecting all the diverticulum-bearing area. In 42 cases in which radical operation was performed at the Mayo Clinic the mortality was 14 per cent. In most of these cases there was a history of several attacks, and should our patient have another attack we should feel justified in resecting the entire diseased portion of the bowel.

Attention was first called to this condition by Graser in 1898, and since then a number of men have reported cases from time to time, probably the largest number having been reported by W. J. Mayo¹ in 1916. Telling and Gruner² in 1917 discussed very fully diverticula of the large intestine, and were able to collect 324 cases from the literature. They concluded that most of the cases are due to acute infection in preformed diverticula, which are usually entirely innocent, the etiologic factor being generally the irritation of some foreign body. Drummond,³ in

¹ Mayo, W. J.: Jour. Amer. Med. Assoc., 1917, lxi, p. 781.

² Telling and Gruner: Brit. Jour. Surg., 1916-17, vol. 4, p. 468.

³ Drummond: Ibid., 1916-17, vol. 4, p. 407.

reporting his investigations concerning the cause of diverticula, states that he believes the term "diverticulum" should not be used at all, but should be reserved for such congenital conditions as Meckel's diverticulum, and suggests the term "sacculi." He

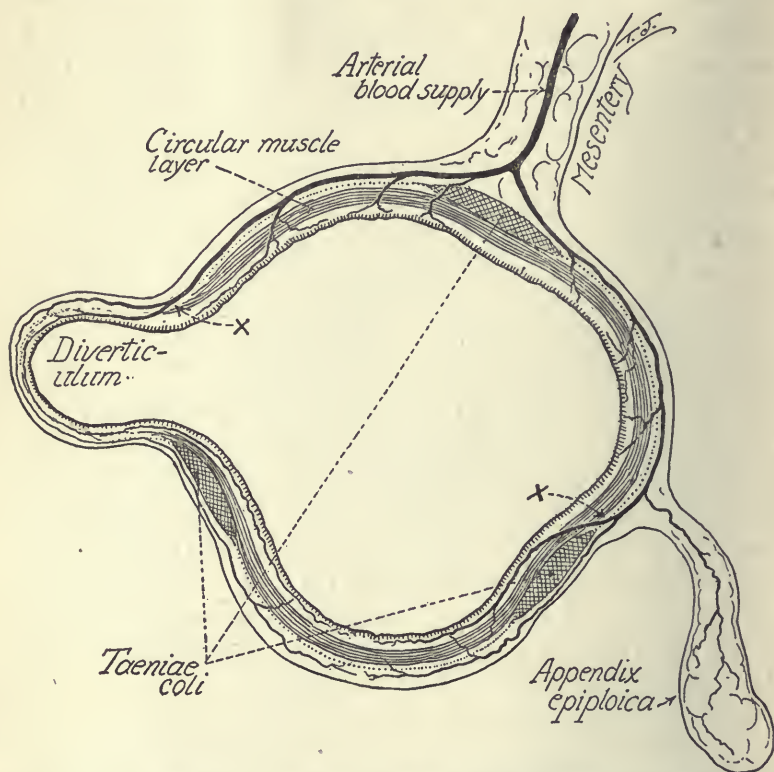


Fig. 367.—Schematic drawing showing usual location of diverticula. Note that the longitudinal muscle band at mesenteric border prevents the formation of diverticula as found in the small bowel. The weakest points (x) are just lateral to the longitudinal bands where the blood-vessels perforate the circular muscle layer.

believes that all such pouches are acquired. Klebs emphasizes the fact that these diverticula or sacculi occur in fat people. Drummond believes they are more apt to occur in people who have been fat and have lost considerable weight. The most important factor, however, in the production of diverticula of the large

intestine is an inherent weakness of the bowel wall. It has been definitely shown that these diverticula occur between the mesenteric and lateral longitudinal muscular bands, usually at the site of the perforation of the blood-vessels (Fig. 367). Such sacculi may number from one to several hundred. They are not confined solely to the large bowel, as similar pouches have been described in the esophagus and, in fact, throughout the gastrointestinal tract. However, they are usually symptomless unless some foreign body causes irritation, and many cases come to autopsy before the presence of diverticula is suspected.

Postoperative Note.—The cigarette drains were removed at the end of five days and two small soft-rubber tubes inserted in their stead. Drainage continued for about three weeks and finally ceased. A report received two months after operation states that she has had no recurrence of the symptoms and, to all appearance, is entirely well.

CLINIC OF DR. GEORGE E. SHAMBAUGH

PRESBYTERIAN HOSPITAL

ACUTE PERICHONDritis OF THE EPIGLOTTIS

Summary: Acute perichondritis of the epiglottis a rare lesion. Sudden onset in present case. Recovery without radical surgical intervention.

THE patient is a woman, age forty-five, who consulted me in March, 1920, complaining of a severe sore throat and great difficulty in swallowing. The trouble had developed four days previous with a chill, profound systemic depression, and a temperature of 102° F. Previous to the onset she had been in perfect health and we were able to discover no local or general cause for the trouble. For three days she experienced difficulty in breathing. This had disappeared when I saw her, but she still experienced extreme pain on swallowing, which she described as the sensation of a fish bone sticking in her throat. At no time had there been any hoarseness.

The patient looked extremely anxious and was very much exhausted. An examination disclosed nothing abnormal in either the oropharynx or hypopharynx. By means of the laryngeal mirror the vocal cords were seen to be quite normal, as was the whole of the interior of the larynx. The epiglottis alone was very much swollen. The laryngeal aspect was, however, quite smooth and appeared quite normal. The swelling was confined to the lingual side and completely filled the space between the root of the tongue. On this aspect of the epiglottis, which was generally swollen, could be seen a more or less circumscribed elevation, perhaps $\frac{3}{8}$ inch in diameter. The patient stated that two days previous she had experienced a sensation of something breaking, followed by the discharge of a quantity of bloody pus, and since then she still experienced from time to

time the taste of pus. Two days later the swelling of the epiglottis had somewhat subsided, but pus was still seen oozing from the angle between the epiglottis and the root of the tongue. After another two days the pus had disappeared, but the epiglottis was still fully $\frac{1}{4}$ inch in diameter. From this time on the condition rapidly subsided and after a week no trace of the trouble could be discovered.

The case appears to be one of perichondritis of the epiglottis, an extremely rare condition except as it develops in the course of laryngeal tuberculosis. Fortunately, the condition was limited to the lingual aspect. Had the process extended to the laryngeal side, the edema might readily have produced a serious condition by extending to the loose tissue within the larynx, causing the so-called edema of the glottis. As it was, the patient suffered some difficulty in breathing when the swelling was most pronounced, pushing the epiglottis over the larynx. It seems possible that the condition seen in this case might have been produced by a fish bone lodging in the lingual side of the epiglottis. The patient, however, gave no history of having eaten fish previous to the onset of this trouble. The symptoms which developed in this case, the chill, the elevation of temperature, and the marked systemic depression are quite characteristic of an acute perichondritis such as we see developing occasionally in the septum of the nose after traumatism.

ACUTE SPHENOID SINUITIS

Summary: Sudden onset of infection of the sphenoid sinus during convalescence from the "flu." Transillumination and radiographic examination of no particular value in the diagnosis of sphenoid sinus trouble.

THE patient is a man forty-seven years old who consulted me January 30, 1920, complaining of a profuse discharge from the right side of the nose associated with a severe occipital headache. The trouble had developed rapidly while recovering from an acute infection which had been diagnosed as the "flu." The head symptoms had begun with a feeling of fulness between the eyes, soon followed by an excruciating headache extending from ear to ear, but somewhat more severe on the right side. The headache was more severe when attempting to walk. The jarring seemed to make the pain unbearable. Before twenty-four hours had passed he began to notice a profuse discharge from the right side of the nose. The most severe pain developed on the third day after the onset of the trouble. The pain was always made worse by sitting upright, and he found the most relief by lying on the left side with the head hanging somewhat over the edge of the pillow, face downward. When the pain was at its height he experienced more or less annoyance from vertigo, which disappeared as the pain subsided.

An examination disclosed nothing abnormal in the left side of the nose. The right nasal chamber was bathed with thick mucopurulent secretion, and it was necessary to cleanse the nose completely before the source of the secretion could be discovered. It was then seen that this did not appear in the middle meatus, that is, under the middle turbinated body, as it does when the antrum or the frontal sinus is involved. The secretion was seen to be oozing out from the space between the middle turbinated body and the septum, and the flow was increased by tipping the head forward. It was possible to pass a probe into a rather large sphenoid sinus. For this purpose a probe was used with

the point curved slightly downward, the bend being about $\frac{1}{2}$ inch from the tip. When this probe was passed into the sphenoid sinus it was found to extend 9 cm. from the anterior inferior nasal spine.

The transillumination test readily excluded both maxillary and frontal sinuses as foci of infection, for in applying this test both frontal and maxillary sinuses appeared quite clear. It is quite possible in the vast majority of cases to determine definitely the absence of a frontal or maxillary sinus disease by means of the transillumination test, for when the light comes through quite clearly one can be sure that these sinuses are not involved. This, of course, presupposes that the examiner has had experience in interpreting the results of this test. It is particularly in the cases where the transillumination gives an indefinite result that a definite diagnosis requires other methods of examination. Where the transillumination fails to show that the sinuses are clear, this cloudiness may be due to anatomic variations as well as to pathologic conditions within the sinus. In order to clear up the diagnosis where the frontal sinus is in question the skiagraph gives the best results. It will show at once when the cloudiness on transillumination is due to a small sinus or, what is not uncommon, a complete absence of this cell. The skiagraph gives the exact outlines of the upper margin of the frontal sinus and shows very distinctly when the sinus is filled with secretion.

As regards the maxillary sinus, the skiagraph is of less value, and usually adds little to the results of the transillumination tests. It is particularly in cases where, due to thick bone, the transillumination test gives a shadow that the skiagraph will show a clear sinus. We have a simple method of determining the conditions within the maxillary sinus. This is by puncture of the nasal wall and irrigation. Where the anatomic relations permit, the simplest procedure is to make the puncture through the middle meatus, that is, above the attachment of the inferior turbinated body. In order to do this readily it is necessary to introduce the trocar under the free edge of the middle turbinated body. Otherwise one is forced to make a puncture too close to the upper border of the lower turbinated body where

the bone is quite firm. The Killian trocar is the best instrument for puncturing through the middle meatus. Very often this instrument can be introduced through the normal opening. It is always important in puncturing this wall of the antrum to direct the point of the trocar downward as well as outward. This is done in order to avoid as far as possible the danger of puncturing the orbit. Caution must be taken, too, in starting the irrigation. The development of pain in the orbit is the signal to desist. When the puncture through the middle meatus cannot readily be carried out, it is always possible to make the puncture through the inferior meatus, that is, under the lower turbinated body. For this purpose a straight trocar is used, the point being introduced well up near the attachment of the lower turbinal.

For diagnosing sphenoid sinus trouble transillumination can be of no assistance, and the skiagraph is of less value than in either the frontal or maxillary sinuses. Fortunately, the sphenoid sinus is not inaccessible for an intranasal examination. Even the operation for draining the sphenoid sinus can be carried out with less difficulty than the intranasal drainage of the frontal sinus. In the case here reported it was not found necessary to operate, since the drainage from the normal opening was not impaired. The acute process disappeared in little more than one week.

The most distinct symptom in this case was the severe occipital headache. I have seen this type of headache in other cases of sphenoid sinus disease and have come to consider it rather characteristic of infection in this sinus. The headache associated with disease of the frontal and maxillary sinuses is the typical frontal type restricted to the affected side. The diffuse frontal headache involving both sides, or where it is centered about the root of the nose, is not characteristic of frontal sinuitis. On the other hand, one-sided frontal headache is found in cases of acute maxillary sinuitis where the frontal sinus is not involved.

PRIMARY SYPHILITIC SORE ON THE FAUCIAL TONSIL

Summary: Demonstration of *Spirochæta pallida* in the exudate from tonsil. Chancre about the buccal cavity not an uncommon occurrence.

THIS case was a man twenty-seven years old who consulted me in May, 1920, complaining of a sore throat of three weeks' duration involving the left side and associated with cervical adenitis under the angle of the jaw on that side. The sore throat was not especially troublesome, in fact, was scarcely noticed except on swallowing. The case had been suspected for diphtheria, and two cultures had been made, but both were negative. The affected tonsil had been treated both with iodine and silver nitrate, but without any appreciable effect.

On examination the right tonsil was found quite normal, but the left tonsil was swollen, inflamed, with the exposed surface covered by a dirty looking exudate. The appearance at once suggested the primary sore of syphilis, although it might have been caused by diphtheria. The duration of the trouble, the absence of severe local or general symptoms, and the marked involvement of the cervical lymphatics all pointed to syphilis as the probable cause of the trouble. The case was referred to Dr. Ormsby, who reports the demonstration of *Spirochæta pallida* from the exudate over the tonsil.

This is the third case of chancre of the tonsil that I have seen. The clinical picture was the same in all three. It was only in the first case observed that I remained in doubt about the diagnosis after examining the throat. This case was seen during the first year that I was in practice, and long before the diagnosis by discovery of the spirochete was known. It did not occur to me at first that the patient could have a primary sore on the tonsil. After watching the case for a couple of weeks and noting the enormous swelling of the cervical lymphatics I decided to amputate the infected tonsil by the method then in vogue for operating on this structure. With the Mathieu

tonsillotome the diseased tonsil was amputated and examined histologically. I was expecting to find evidences of a tubercular process. This, however, was not found, and shortly after the patient developed the symptoms characteristic of secondary syphilis. In this case the patient stated that the trouble had developed as a typical attack of acute tonsillitis to which he had long been subject, only this time the tonsil failed to heal. He was working in a shop with a man taking treatment for active syphilis and both had been using the same drinking-cup.

The occurrence of chancre about the buccal cavity is not so uncommon, the lesion being usually located on the lips. In one case I diagnosed a chancre on the tongue of a young woman. It was located on the dorsal surface about $\frac{3}{4}$ inch from the tip.

SUPPURATION OF THE LABYRINTH FOLLOWED BY INTRACRANIAL COMPLICATIONS

Summary: Cholesteatoma in the middle ear producing a fistula into the labyrinth. Fatal termination from intracranial complications.

THE case was that of a man twenty-seven years old who consulted me in February, 1920. His complaint was annoyance from vertigo, which had been present off and on for a couple of weeks. He gave a history of suppurating ears following scarlet fever at the age of five. The left ear had long since ceased discharging, but the right ear had continued to discharge. Since the onset of the vertigo he noticed that any quick movement of the head brought on sensations of dizziness.

On examination, the left ear was found dry, the perforation of the drum membrane being closed by a scar. In the right ear there was a marginal perforation occupying the upper posterior quadrant. Through the perforation one could readily discern the whitish flakes characteristic of a cholesteatoma formation. There was a small amount of foul-smelling secretion in the fundus of the canal. The penetrating odor was so characteristic of a cholesteatoma that one could almost make a diagnosis from that alone. The perforation in the upper posterior quadrant producing an erosion of the bony margin is the type of perforation which is always associated with a cholesteatoma. Such marginal perforations are not necessarily located in the upper posterior quadrant, although this is the most frequent site. The same type of perforation is often found in Shrapnell's membrane. The formation of a cholesteatoma results from an invasion of the middle ear by epidermis from the external meatus. In order for such an invasion to take place it is necessary first of all that the ear be the seat of a chronic suppurative otitis media, and in the second place the perforation must be a marginal one, for the reason that the invasion of epidermis can only take place where the path is over a more or less smooth field. A central

perforation in the drum membrane does not provide this latter condition. A chronic suppurative otitis media, therefore, in which the perforation is central, that is, when it does not involve the margin, no matter what its size, is never complicated by a cholesteatoma formation. There is one exception to this rule, when in the presence of a large central perforation the handle of the hammer has become adherent to the inner wall of the tympanic cavity. Under these circumstances the smooth surface suitable for the invasion of epidermis is provided. In such cases one occasionally sees the development of a cholesteatoma. What happens in the cholesteatomatous process is somewhat as follows: The epidermis, having greater vitality than the mucous membrane when transplanted to the tympanum, supplants the latter. The epidermis now lining the middle-ear cavities, the aditus and antrum, as well as the tympanum, is subjected to conditions of moisture and absence of air which cause exfoliation. This process keeps up until the middle-ear cavities are filled by a mass made up of concentric layers like those of an onion. On the interior of this mass decomposition takes place with the formation of cholesterin crystals, hence the name, cholesteatoma. The constantly increasing size of the cholesteatomatous mass produces a gradual absorption of the surrounding bony wall in spite of nature's effort to check the progress by a process of osteosclerosis. The result is that the process eventually erodes through the tympanic bone, producing a perforation into the middle-brain fossa, the lateral sinus, or into the labyrinth. The labyrinth fistula thus produced is usually found in that part of the horizontal semicircular canal forming the floor of the aditus ad antrum. Only rarely does it produce a fistula in the superior canal.

A further examination of this case disclosed the fact that the patient had not only a cholesteatoma in the middle ear, but that this had actually produced a fistula into the labyrinth. This was demonstrated by making alternating compression and suction of air in the external meatus. On compression there developed a nystagmus with the quick component directed toward one side, and on suction a reverse nystagmus, that is, with the

quick component directed toward the opposite side. By means of caloric stimulation, which in this case was carried out by injecting a steady stream of compressed air into the external meatus, it was possible to elicit a slight response in the form of a rotary nystagmus with the quick component directed toward the opposite side. A functional examination of the hearing found the right ear practically normal, but apparently no remnant of hearing in the left.

The patient was sent to the hospital where he could be more carefully watched. For about a week there was no apparent change in his symptoms except that all evidence of function disappeared from the labyrinth. During this time the patient insisted that he was feeling very well, largely because he had ceased to have any active vertigo. There were two ominous symptoms, however, which persisted. One was the continuation of a slight temperature, rarely going above 99° F. Associated with this there was more or less annoyance from a slight but persistent headache. I became very anxious, fearing an extension of infection from the labyrinth to the cerebellar cavity, but the patient could not be persuaded that he was ill enough to require an operation. It was clear to me that in the presence of a cholesteatoma producing a fistula into the labyrinth, which, in turn, had led to a diffuse labyrinthitis and a complete destruction of labyrinth function, that the proper course was to resort to a radical mastoid operation and the establishment of free drainage from the labyrinth. The latter is accomplished by opening the vestibule, chiseling away the lower border of the oval window, and by making an opening into the vestibule behind the facial ridge. This is done by chiseling into the horizontal canal where this lies exposed in the floor of the aditus, and then following the canal forward until an opening is made into the vestibule.

At the end of a week the patient instead of improving was growing somewhat worse, and for the first time began to develop a slight spontaneous nystagmus with the quick component directed toward the same side. This symptom, developing in the wake of a diffuse destructive labyrinthitis, points unmis-

takably to the occurrence of a cerebellar complication. I impressed on the patient the necessity of an immediate operation. He reluctantly consented to an operation the next day provided he was not better. That night he became very restless and about midnight became unconscious. In less than two hours he was dead. It was not possible to secure an autopsy.

This case illustrates very clearly the danger when a suppurative disease of the middle ear extends to the labyrinth. So long as the labyrinth involvement remains circumscribed, that is, so long as it is possible to demonstrate the fistula symptom, there is no danger of an intracranial complication developing. When, however, the inflammation in the labyrinth develops into a diffuse labyrinthitis, destroying the function of both the hearing and of the semicircular canals, then a condition exists which frequently leads to a fatal intracranial complication. This is especially true in cases of chronic suppurative otitis media where there exists in the middle ear a condition like a cholesteatoma that requires a radical mastoid operation. The radical operation with the drainage of the labyrinth is all the more urgent when, as in this case, there persists an elevation of temperature with headache. When one waits until the development of definite symptoms of an intracranial complication the operation, as a rule, will be too late to save the patient.

CHRONIC SUPPURATIVE OTITIS MEDIA WITH CHOLESTEATOMA

Summary: Bilateral cholesteatoma following chronic suppurative otitis media. Radical mastoid operation on one side with no impairment of hearing.

THE patient, a man aged twenty-six, consulted me in January, 1920, complaining of an annoying headache, and a chronic discharge from the left ear, which had persisted since childhood.

The examination disclosed the fact that the chronic suppuration was bilateral, although the discharge was more marked from the right ear. There existed a marginal perforation located in the upper posterior quadrant of both drum membranes. In both ears granulations were protruding, more marked in the left ear, through the perforation. There was some evidence of an offensive odor to the discharge. The functional tests showed that the hearing was about equally reduced in both ears, the whispered voice being heard at about 2 meters. It seemed probable that we had to deal with a form of chronic suppuration in both ears that might require a radical mastoid operation.

My first effort was to destroy these granulations in order to determine more accurately the character of the middle-ear disease. Should the process prove to be complicated by caries or a cholesteatoma, a radical operation would be called for. On the other hand, should it appear that the disease was restricted to the mucous membrane of the middle ear, that is, if there was no involvement of the underlying bone, the radical mastoid operation would not be necessary, since this type of disease does not lead to serious complications. The protruding granulations in the right ear were cauterized with a bead of silver nitrate. When they were sufficiently shrunken it was possible to demonstrate the whitish flakes characteristic of cholesteatoma. The patient was then advised to submit to a mastoid operation. This was urged all the more strongly because of the persisting headache,

which is always a more or less ominous symptom in cases of chronic suppuration where the examination discloses a bone-invading process.

It was decided to overlook the less active process in the left ear, although I suspected a similar cholesteatomatous process on that side. The object in handling the two sides separately was this: In performing the radical mastoid operation one can never be sure that there may not result a more or less marked depression of the hearing after healing has taken place. It is always preferable, therefore, when undertaking this operation to attack one side at a time, selecting the side in which the disease is the more active. Should it happen that the end-result after the operation is a marked decrease in the hearing on that side, no operation should be undertaken on the opposite ear unless the process in that ear becomes more active, and especially where it gives rise to symptoms suggesting a possible intracranial extension. The reason for this conservative position is quite apparent. A patient will always prefer to take some risk from a possible complication rather than take the chance of losing the one hearing ear. On the other hand, should symptoms develop threatening the life of the patient, one is quite justified in taking some risk of increasing the deafness by resorting to an operation. This point is too often overlooked, and patients are subjected to a double mastoid operation at one time. I have seen several such cases where, as a result of such procedure, patients have been left practically deaf for life, when they would have preferred taking some chance of a possible complication rather than to have lost their hearing.

In this patient the radical mastoid was performed on the right side. The result showed no appreciable change in the hearing, and I felt justified in recommending the operation for the opposite side, in which further observation had demonstrated the presence of a cholesteatoma. The patient, however, has not as yet consented to the second operation.

CLINIC OF DR. ALBERT J. OCHSNER

AUGUSTANA HOSPITAL

CARCINOMA OF THE PANCREAS

Summary: Anastomosis between the gall-bladder and duodenum for relief of common duct obstruction due to carcinoma of the pancreas.

WE have for operation this morning a patient presenting an interesting and rather unusual condition. She is a woman fifty-three years old, who up to six weeks ago had been in very good health. At this time she had a feeling of fulness in the epigastrium which was relieved by vomiting. Immediately after this she became jaundiced. The jaundice continued to increase until a few days ago, when, the patient thinks, the color faded slightly. At intervals since the onset of the jaundice the stools have been clay colored and the urine has contained blood. She has also occasionally had nosebleed. She complains, too, of severe itching of the skin.

On examination we find the scleræ deeply icteric, showing a lemon color rather than a simple icterus. In the epigastrium there is a perceptible and palpable fulness or bulging, which is of firm consistency and painless to pressure. This mass moves downward slightly on deep inspiration. The tumor occupies the right hypochondrium and midepigastria zones. The liver is intimately connected with the tumor mass and extends downward below the right costal arch for a distance of 4 cm.

Examination of the urine is negative except for the presence of bile, as are also the Wassermann test and the blood.

We have made a diagnosis of obstruction of the common duct due to a malignant growth involving the pancreas.

The patient has been thoroughly anesthetized with ether by the drop method, having received a hypodermic injection of

$\frac{1}{4}$ gr. of morphin and $\frac{1}{150}$ gr. of atropin one-half hour before commencing the anesthesia, in order to reduce the latter to a minimum. In many of these cases we have operated under local anesthesia with $\frac{1}{2}$ per cent. novocain. We are making a longitudinal incision in the right rectus abdominis muscle and shall open the peritoneal cavity in the usual way. As the gall-bladder comes into view we note that it is enormously distended. The common duct also is greatly dilated. Palpation reveals an enlarged pancreas of stony hardness which is evidently the cause of the obstruction to the common bile-duct.

It is evident that it will not be possible for the bile to again enter the intestines unless a new communication is established. In order to accomplish this we plan to make an anastomosis between the gall-bladder and the duodenum.

The first step will consist in evacuating the contents of the distended gall-bladder by means of a large trocar (Fig. 368, 1). About 100 c.c. of green mucopurulent bile is removed together with a number of small gall-stones. We will now insert the trocar into the common duct and empty it (Fig. 368, 2). We have removed about 500 c.c. of the same kind of bile that was found in the gall-bladder. The duodenum and common duct are now approximated (Fig. 368, 3), the opening in the common duct enlarged, and interrupted silk Lembert sutures applied between the two. A transverse opening of the same size as that in the common duct is now made in the duodenum and the anastomosis is established between the two by means of Connell sutures (Fig. 369, 4). This row of sutures is covered by a row of interrupted silk Lembert sutures (Fig. 369, 5). We are using silk throughout the operation because of the dissolving effect of the pancreatic juice upon catgut. The edge of the gall-bladder is now attached to the peritoneum (Fig. 369, 6). This being completed, we are closing the abdominal wound in the usual manner.

We have been able to make this anastomosis without placing the tissues of the common duct and duodenum upon tension. This will favor prompt healing and will produce satisfactory drainage of the common duct.

After-history.—A free flow of bile into the intestinal canal

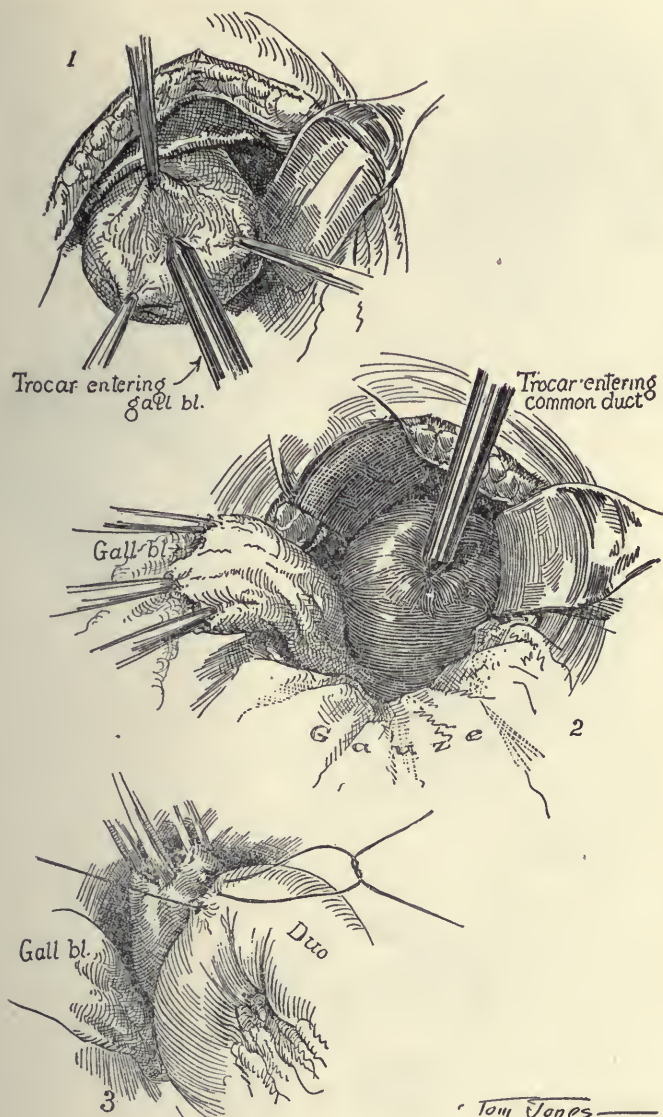


Fig. 368.—1, Drainage of the gall-bladder by means of a trocar. 2, The gall-bladder has been drained, exposing the enormously dilated common duct, which is also being emptied with a trocar. 3, The common duct opening enlarged and the first row of anastomosing sutures being applied between the common duct and duodenum.



Fig. 369.—4, Applying Connell sutures. 5, Completing the anastomosis. 6, Suturing the gall-bladder to the peritoneum. 7, Diagrammatic sketch showing the relative size of the common duct.

started almost immediately after the conclusion of the operation, as shown by the color of the feces. The patient's general condition improved very rapidly. She was able to be out of bed two weeks after the operation and returned to her home two weeks later. She continued to gain in strength until the end of three months, at which time the tumor of the pancreas was found to have markedly increased in size and she was beginning to lose strength. No report has been received since that time. There can be no doubt, however, but that the patient was greatly benefited by the operation because of the relief from the itching of the skin, the pressure in the gall-bladder and common duct, and from the hemorrhages which were undoubtedly due to the absorption of bile.

CLINIC OF DR. CAREY CULBERTSON

COOK COUNTY HOSPITAL

FIBROID OF THE UTERUS

Summary: Cardinal symptoms of fibroid of the uterus. Differential diagnosis. Technic of removal. Whether to perform total or subtotal hysterectomy a question to be decided according to the individual case. A new method of peritonization.

THE case for consideration this morning is that of an American negress, thirty-six years of age, who comes into the hospital complaining of pain in both sides of the lower abdomen. The onset of her illness was three months ago and the pain was first located in the midline over the bladder. It was sharp and cramping. She was confined to bed for one week. Since that time she has had a dull aching, and at times sharp and cramping pain in both the right and left iliac regions. More recently she has noticed a sacral backache which is constant and at times severe. This pain has not been associated with nausea and vomiting, chills, or fever at any time. The patient has been married twice; by occupation is a housewife. Her first marriage took place ten years ago and the second seven months ago. There have been no pregnancies.

Menses began when she was twelve years of age. They have come regularly, every twenty-eight days, lasting but two days, with no dysmenorrhea, and moderate in amount. The last period took place nineteen days ago.

On examination this patient is a well-developed, well-nourished woman apparently of the age given. Examination of the head and chest reveals nothing abnormal. The abdomen is flat, soft, elastic, and somewhat thick walled, through which a hard mass is palpable just behind the symphysis, rising slightly above the plane of the inlet. This mass is not tender, is movable,

symmetric, and even. Palpation on either side of this mass elicits some tenderness, causing the patient to contract the muscles in both iliac regions. The vaginal introitus is narrow; the vagina is short and distensible. The cervix, which is up and forward, is conical, free, and closed. The corpus is retroflexed, the fundus apparently lying in the culdesac of Douglas, while the upper pelvis is occupied by a hard, slightly movable mass in the midline, which is identical or continuous with the mass palpated through the abdomen. This mass likewise is smooth and even. The appendages are apparently prolapsed and somewhat thickened. On neither side, however, is tenderness elicited by vaginal palpation.

Examination of the patient's blood shows 14,100 leukocytes and 95 per cent. hemoglobin. Blood-pressure is 120 systolic and 75 diastolic. The urine is negative except for the fact that it shows a few leukocytes. The temperature is normal.

The patient has also complained of frequency of urination for the past three months. For this reason, as well as for the fact of a pelvic tumor existing with possible involvement of the bladder, cystoscopic examination was performed one week ago. This showed an edematous mucosa over the trigone and a small extravasation of blood along the right ureteral orifice. Ureteral catheterization was not complete.

The urinary bladder is disturbed to a greater or less extent in most large fibromata. Tumors of the cervix more often produce retention, while those of the corpus, especially of the anterior uterine wall, cause irritability. Where the bladder is drawn up into the abdomen urinary frequency is the rule. Further, where tumors in the pelvic situation become impacted, pressure on the ureters results in ureteral dilatation, hydronephrosis, and even pyelitis, with ensuing infection.

Our diagnosis in this case is that of a fibroid tumor of the uterus with retroflexion of the uterus and prolapse of the appendages. This case demonstrates very well a not infrequent observation in uterine fibromata, *i. e.*, an absence of some of the cardinal symptoms of this disease. The cardinal symptoms of fibroids are: (1) Uterine hemorrhage, usually characterized by

excessive bleeding at the menstrual period; (2) dysmenorrhea; (3) leukorrhea, and (4) pain. In this particular case there is no menorrhagia nor any form of uterine hemorrhage; there is no dysmenorrhea; the patient has not complained of vaginal discharge, nor are there evidences of leukorrhea. The pain of which she complains is, in all probability, due, at least in some measure, to the presence of the tumor. The pain in fibroids of the uterus is of three varieties: First, the pain associated with menstruation; second, pain in the tumor itself, which is unusual; third; pain in the surrounding structures, that is, pain due to pressure. A tumor of the size found in this patient's pelvis may well produce pressure symptoms, since it is just large enough to fill the pelvic inlet, being about the size of, or slightly larger than, a fetal head. The possibility that the appendages may be at fault and therefore the cause of the pain must not be lost sight of in this case. Palpating laterally on either side through the vagina we make out a prolapse of the appendages, which are not tender, but show some thickening. This thickening may be nothing more or less than varicose veins in the broad ligaments, which, however, if they exist, are factors also in the production of pain. On the other hand, this thickening that we feel may represent a bilateral salpingitis, which, if chronic, need not necessarily be tender. It is quite probable that, at the time of the acute onset three months ago, there was an active inflammatory reaction in the appendages. It is not uncommon in fibroids to find the appendages involved in adhesions, the tubes being enlarged, closed and distended, forming the well-recognized hydrosalpinx. It is thought that this change is very often accomplished as a result of nothing more or less than pressure due to the peritoneal surfaces rubbing together until the fimbriated extremities of the tubes become closed or buried in adhesions, after which the tubes distend with serum. On the other hand, the tubes may be directly involved in a suppurative salpingitis, the result, as a rule, of gonorrheal infection. It is not at all uncommon to find a pyosalpinx associated with fibroids of the uterus. The ovaries likewise are subject to changes which are thought to be due again to pressure or at least to congestion of

the pelvic blood-vessels. These changes are usually those described as fibrocystic degeneration, with or without hypertrophy of the organ. The ovary is enlarged, tense, and contains multiple small cysts. Occasionally, too, in tumors of this size particularly, the ovaries are found to be flattened out against the pelvic wall, as if they had been rolled out by a rolling-pin.

The question of leukocytosis brings up an interesting point. A leukocytosis of 14,100, while not a marked reaction, at the same time is distinctly above normal and of some significance. It suggests, first of all, the probability of some chronic pelvic peritonitic reaction, such as would accompany a chronic salpingitis. It also suggests the possibility of a degenerative process involving the tumor itself, either actual suppuration or necrobiosis. Necrobiosis in a fibroid is not so infrequent as is thought, and where it is extensive it is very apt to be expressed by some increase in the white blood-cells. Suppuration, on the other hand, is particularly apt to be accompanied by a low-grade fever, the temperature ranging from 99° to 100° F., together with loss of appetite, headache, malaise, etc.

While accepting the diagnosis of uterine fibroid, which was made in this case on entrance into the hospital, we must not leave out of consideration the other conditions which might obtain. In the differential diagnosis of abdominal and pelvic tumors it is always best if we will consider tumors with respect to the abdominal situation separately from those in the pelvic situation. In this particular case the tumor does not rise into the abdomen and, therefore, we do not need to consider those conditions which might obtain higher up. The differential diagnosis in this case, therefore, resolves itself into a consideration of pathologic conditions in the pelvic situation only.

In the first place, we must never leave out of mind pregnancy. We have here a swelling which is smooth, even, symmetric, free and not tender, rising slightly above the plane of the inlet; in other words, about as high as a four- or four-and-a-half month pregnancy. The tumor is, however, hard and board-like, and there are none of the presumptive signs of pregnancy associated with it, that is to say, there is no cyanosis of the

vaginal introitus or softening of the cervix either at the external os or through the cervical canal. There is no amenorrhea or other subjective evidences of early pregnancy, such as changes in the breasts, morning sickness, etc. On the other hand, there is a history of sterility of long standing. Nevertheless, before accepting the diagnosis of fibroid we must not forget that fibroids and pregnancy appear together.

Interstitial pregnancy and ectopic pregnancy, particularly tubal, must be considered. Here, again, we should have some of the presumptive signs of pregnancy, and the swelling would be unilateral rather than in the midline and would be of softer consistency, probably by this time associated with much greater pain than this patient has experienced, if, indeed, not shock and collapse.

Pelvic hematocele, the result of a ruptured ectopic pregnancy, should be readily differentiated from fibroma. As a rule, however, hematocele lies lower in the pelvis, bulging down on one side or the other or filling up the posterior culdesac. It is more apt to require differentiation from pelvic abscess than from uterine fibroid, though I have seen 2 cases of ruptured ectopic pregnancy that very closely suggested a fibroid tumor of the uterus.

Tumors of the ovary, particularly hard tumors, are not easy to differentiate from uterine fibroids. Ovarian fibroma, carcinoma, or sarcoma develops into a tumor very much the same as this one in consistency, but it should be more unilateral and is more apt to rise higher in the abdomen.

Of the cysts, a dermoid is most apt to resemble fibroid, and with a long pedicle may swing over into the midline or into the opposite side of the pelvis, simulating very closely a subserous uterine tumor. Or a simple cyst with twisted pedicle and intracystic hemorrhage will on occasion produce a tumor quite as hard as this one, and with a history of acute pain, at that.

Ovarian cysts, particularly when they are tense and palpated through as thick an abdominal wall as this patient possesses, or when they are heavy and multilocular, as in the pseudomucinous variety, may very readily be mistaken for a fibroid growth.

Hydrosalpinx and pyosalpinx have been mistaken also for

fibroid tumors of the uterus. Theoretically, they do not form such large masses as this. They are apt to be lower down in the pelvis and associated with fixation and tenderness, which we do not have here. We have, however, seen in this clinic such swellings of the tubes quite as large as a fetal head, embedded in the pelvis or, indeed, rising in the lower abdomen and again closely resembling uterine fibromata.

Large sactosalpinx is also occasionally associated with fibroids of the uterus. Tumors of the tubes need hardly be considered here, since, while they occur, they are extremely rare and seldom large.

Other rare conditions which need only be mentioned by way of concluding the remarks on differential diagnosis are ectopic situations of the kidney and of the spleen. These organs, it is well known, may descend into the pelvis, and when such is the case have been mistaken for fibroid tumors of the uterus.

The patient having been prepared for operation, we will now proceed with the opening of the abdomen. With the peritoneal cavity opened and the patient in the Trendelenburg position we find the pelvic inlet occupied by a single fibroid mass about 12 cm. in diameter, rising from the anterior wall of the uterus. It is perfectly free. The uterus beneath it is retroflexed, the fundus lying in the pouch of Douglas. Both appendages are prolapsed and adherent on either side to the posterior broad ligament and to the pelvic walls. The tubes are kinked, clubbed, closed, and thickened to the size of one's finger. The right ovary is fibrocystic and hemorrhagic and is possibly slightly enlarged. The left ovary is likewise involved, but to a lesser degree. The posterior wall of the uterus is adherent to the rectum from the fundus down to the ureterosacral ligaments. The sigmoid flexure is adherent to the left infundibulopelvic ligament. The bladder has been elevated into the abdomen by the tumor growing beneath it. In the right infundibulopelvic and ovarian ligaments is found an extensive varicose condition of the veins which is not present on the left side. The tumor is apparently a single fibroid mass, with no smaller nodules growing from it. So far as can be seen the mass involves

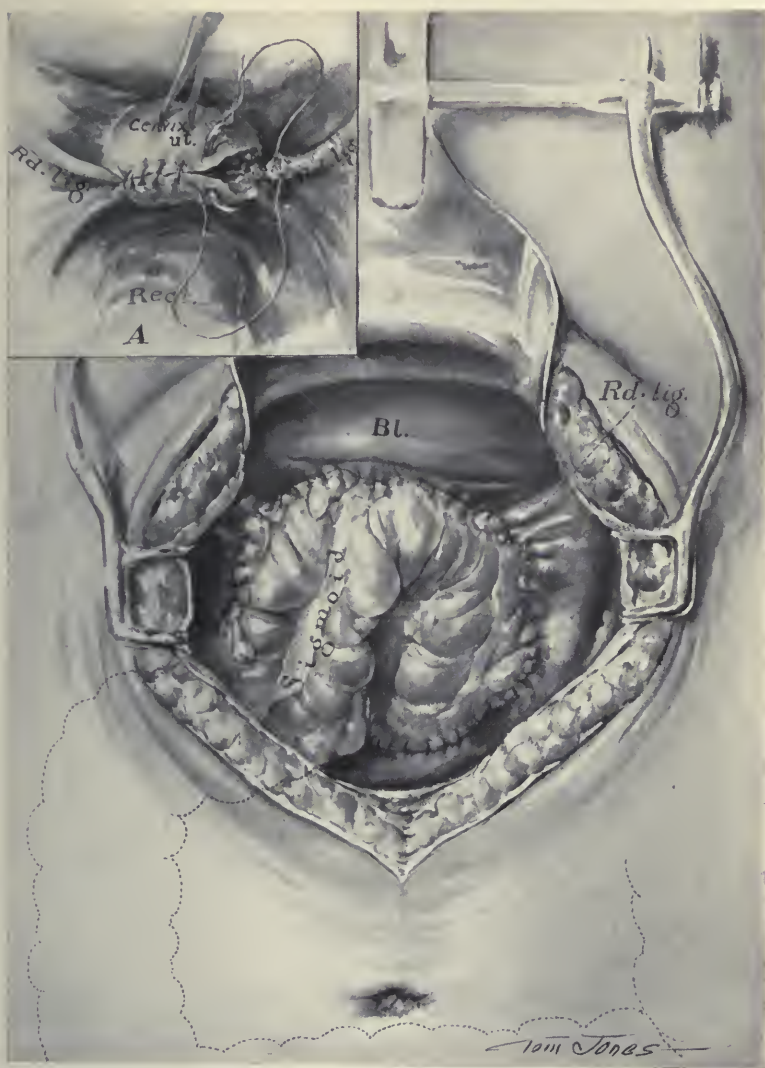


Fig. 370.—Sigmoidorectal peritonization of the pelvis after subtotal hysterectomy completed: A, Round ligaments being sutured into cervical stump as the first step in this method of peritonization.

the entire uterine wall. The tumor is subserous, but sessile rather than pedunculated. We will, therefore, extirpate it by

hysterectomy instead of by myomectomy, taking out at the same time both tubes. In doing hysterectomy it is our custom to remove the tubes with the uterus. In this case salpingectomy is actually indicated, the tubes being involved in a chronic inflammatory process.

The upper pole of the tumor is grasped with two volsella and held as far to the right side as possible. The left tube is then grasped by a clamp at its free end and a ligature is placed between it and the ovary and tied. That portion of the tube grasped in the clamp is now cut away from the infundibulopelvic ligament. Next, a ligature is placed between the round ligament and the tube, as close to the uterine wall as possible, and is brought out again through the broad ligament close to the previous ligature. This is for the purpose not only of ligating the anastomosing branches of the uterine and ovarian vessels, but of keeping together the left broad ligament which we may desire later to use for purposes of peritonization. This second ligature makes it possible to cut the tube away from its attachment as far as the uterine horn. The next ligature includes the round ligament, and this, in turn, is cut away from the uterus. In order to prevent bleeding through from the other side we will now start from the right side in exactly the same way, though clamps may be placed on the uterine side of the wound in order to control collateral circulation. The right ovary is considerably more enlarged and more cystic than the left, but it has not been badly lacerated in freeing it from its bed of adhesions and it has not been so involved as to disturb its function. There is no particular reason why it need be extirpated. I am a strong advocate of conservation of ovarian tissue, and I practically limit the indication for oöphorectomy to two processes: first, abscess formation, and second, neoplastic growth. Moreover, if it is advisable to leave one ovary in a woman thirty-six years of age, there is no reason why two should not be left. Therefore neither ovary will be removed, notwithstanding the degree of abnormality that has been described.

The tissues have been ligated as before and the right tube and round ligament having been cut away, and the tumor drawn

well to the opposite side, the base of the broad ligament is sought for the uterine artery. This is grasped with very little other tissue and a ligature passed carefully beneath it, close against the uterine wall. This ligature is tied, the uterine side is grasped with a clamp, and the broad ligament is severed as far as the point where the vesical peritoneum is reflected from the uterus. This is cut across from side to side with scissors high up, so that a generous peritoneal flap is preserved. In this way there is less danger of impairing the integrity of the bladder wall as it is reflected from the cervix. In reflecting the vesical peritoneal flap from the cervix it is necessary to cut with the scissors through the middle portion of it where there is a broad vesico-uterine ligament. Laterally, however, it pushes away very readily with the finger wrapped in gauze. One or two more ligatures on either side are sufficient to permit the broad ligaments to be cut away well down toward the vaginal vault. The blood is carefully sponged away in order to inspect the vessels directly, and thus make certain that they have been ligated and that the ligatures are holding.

Too great care cannot be taken in extirpating fibroid tumors of the uterus to avoid damage to the ureters. These structures are usually displaced out and downward, upward only if the tumor has grown beneath the ureters into the parametria. At times, too, as a result of pressure which displaces and disorganizes the bladder, urethra, and ureters, as well as the renal pelves, the ureters become thickened or dilated, a condition adding seriously to the risk of operation. When multiple fibroids, separate from each other, are present, these changes are all the more complicated. The corresponding outward displacement of the uterine artery only adds to these complications, so that hysterectomy becomes at times an exceedingly trying procedure.

The question of total or subtotal hysterectomy for fibroids comes in here. There are those who strongly advocate total hysterectomy in every case where one is taking out the uterus for one purpose or another. In my practice that depends entirely upon conditions. Where a woman has been through a pregnancy with or without damage to the cervix I think it is

best to remove the uterus *in toto* when hysterectomy is being performed. Certainly where the cervix has sustained either laceration or inflammatory reaction that should be done without question. In cases such as this, however, where the patient has never experienced pregnancy, where the cervix is conical where there has been no salpingitis, and especially in the absence of leukorrhea, it seems unnecessary to remove the entire cervix. The ease of the operation also has a bearing upon the case. In obese women where the depths of the pelvis are not always readily accessible or where the patient is not taking the anesthetic favorably, or where, for one reason or another, such as heart disease or nephritis complicating the situation, it is desirable to shorten the operation as much as possible, I think that subtotal hysterectomy is advisable.

The lower portion of the cervix being exposed, the anterior cervical wall is grasped below the point where it is desired to amputate it with the volsellum and held up. This incidentally holds away the bladder. The uterus is now amputated with the scalpel by a wedge-shaped incision from above downward through the anterior cervical wall first, and then through the posterior wall. You note that the last ligature on either side has not been cut away. It is my custom to leave these until the cervix is closed, since they are the lowest landmarks showing the extent of our dissection. Before closing the cervix I cauterize it very thoroughly with the electric cautery. This is for the purpose of burning out such cervical mucosa as is left and particularly to produce an obliteration of the cervical canal. I regard this as a very satisfactory substitute for total hysterectomy and as a prophylactic against subsequent cervical discharge. The cervix is closed with iodine catgut which is stitched through continuously from one side to the other, the first row closing merely the cervical canal. Starting on the left side, I proceed across the cervix to the right, undersewing the last ligature on each side, after which these are cut away, and then, without tying, going back and bringing together the sharp edges of the cervical walls. In doing this we stitch first the right round ligament into the right angle and then finally the left round liga-

ment into the left angle, after which the suture is tied. This fixation of the round ligament into the cervical stump not only reinforces the pelvic floor, but is the first step in the peritonization of the pelvis.

The raw posterior culdesac remains uncovered. This is where the uterus was adherent to the rectum and the appendages to the pelvic walls and broad ligaments. Also the posterior vesical wall for a short distance was freed from its adhesion to the anterior uterine wall. The problem confronting us now is the method by which we can safely and thoroughly cover over this raw surface. For many years it has been our preference to effect peritonization of the raw pelvic walls in every case before closing the abdomen. These raw areas are in the great majority of cases posterior to the plane of the broad ligament, that is to say, involving in a great majority of cases more or less of the posterior culdesac. With the round ligaments stitched into the cervical stump and presenting clean peritoneal surfaces, we have left the raw Douglas pouch and, in this instance, a small raw area anteriorly. The sigmoid flexure can be used to very excellent advantage for the purpose of covering over this denuded area. This structure is, therefore, permitted to slide down into the pelvis, where it naturally adjusts itself in what might be called a normal attitude. Its adhesion to the left infundibulopelvic ligament was not broken up. The round ligaments having been stitched into the cervical stump and the broad ligament posteriorly having been caught in the second ligature on either side, it is seen now that the broad ligaments in this way are pulled in toward the center of the pelvis, and thus peritonization is already effected on the left side for one-half the distance to the round ligament. It remains, therefore, merely to complete the adhesion of the sigmoid flexure to what is left of the raw edge from the left side, across the center to the right side. This is accomplished with a light iodized catgut suture on a small round needle. A simple running stitch whips the sigmoid up against the raw peritoneal edges as from left to right. In the center the vesicoperitoneal flap is brought over from its anterior position before passing on to the right side. In order

to come out posteriorly where the rectal peritoneum is reflected it is necessary to permit the sigmoid flexure to rotate one-half way over. I always aim to accomplish this rotation where the vesicoperitoneal flap is utilized, since here we have the greatest flexibility of tissues and are thus able to avoid tension. As soon as we arrive at the right round ligament we drop at once down to the right pelvic wall. From here on it is merely a matter of whipping the clean peritoneal edge to the sigmoid, passing on over the right ovary and down the right pelvic wall across the posterior pelvic space, and stopping where the rectum is reflected from the posterior pelvic wall, just to the right of the promontory of the sacrum. This line of suture may be carried as high as the brim of the true pelvis if the area of raw surface to be closed over rises that far. It has been observed no doubt, while this simple and yet radical peritonization scheme is being carried out, that but two stitches have actually gone into the intestinal wall, but that the fat tabs have been used almost entirely throughout the entire line of suture. The appendices epiploicæ are very useful indeed on this so-called high or sigmoid flexure peritonization. Thus the peritonization of the pelvis is completed simply and yet effectively. The idea, as has been explained in previous clinics, is to prevent loops of the small intestine from becoming adherent in the raw areas of the pelvic floor. In the last analysis it is adhesion and kinking of the ileum that produces postoperative distress and partial or complete intestinal obstruction, at least in the lower abdomen, and it is to prevent the ileum from becoming adherent and obstructed that we strive after perfect peritonization. The best way to do this is to go on the principle that something must become adherent to every raw surface that is left in the pelvis. We know that relative fixation of the sigmoid flexure in its normal position is not accompanied by postoperative distress and that it does not produce intestinal obstruction. Therefore, we not only place the sigmoid flexure across such a raw posterior culdesac as we have here, with the idea that it may kindly become adherent, but we determine that it shall become adherent and where this adhesion shall take place.

This same method of sigmoid flexure peritonization, varied according to different pelvic conditions, has been demonstrated in previous clinics.¹

Further examination of the abdomen shows that the stomach, colon, and kidneys are normal. Two large stones are palpable in the gall-bladder. This organ, however, is not enlarged in size and its walls are not thickened. These stones will be left for subsequent treatment. It is not beyond the endurance of every patient to sustain a short, simple gall-bladder operation following hysterectomy, but unless circumstances demand such an operation I think it is best to postpone a second radical procedure until another time. The appendix is 3 inches long. It is thick, indurated, and adherent at the tip. We will remove it according to the technic described in a previous clinic,² after which the abdomen will be closed, care being taken merely to evert the raw edge of the peritoneum as a last step in the peritonization following abdominal operation.

Examination of the specimen shows that we have a un-nodular fibroma, 12 cm. in diameter, which involves the greater portion of the anterior uterine wall. No degenerative changes have taken place. The uterine cavity is 7 cm. deep, it is regular and its mucosa is normal, at least grossly. The attached tubes show relatively little change in the isthmic portions, but the ampullæ are clubbed and closed, with thickening of the walls and mucosa characteristic of the so-called "catarrhal salpingitis."

¹ Surgical Clinics of Chicago, Vol. III, p. 1275.

² Ibid., Vol. IV, p. 179.

CLINIC OF DR. DANIEL N. EISENDRATH

MICHAEL REESE HOSPITAL

PYELITIS OF PREGNANCY AND THE PUERPERIUM—A CLINICAL LECTURE

Summary: Presentation of two cases illustrating two distinct types of pyelitis of pregnancy and the puerperium. Differentiation from malaria a simple matter because of the lack of periodicity in the occurrence of chills, fever, and sweats. Three clinical types. Methods of treatment. Expectant treatment advisable before resorting to more radical methods.

At the last clinic the subject of renal infection in general was discussed, and several patients illustrating both the hematogenous and ascending routes of invasion shown. I propose today to demonstrate some cases which represent various phases of renal infection as it is found in the pregnant and parturient woman.

Before taking these up in detail let me again impress upon you the necessity of having a clear conception of the various avenues along which infection can reach the upper urinary tract as well as of the pathologic changes in the ureter, renal pelvis and parenchyma, and in the perinephritic tissues, which are the direct sequel of an invasion by bacteria and of the toxins which they produce.

There is but little variation in the clinical pictures resulting from renal infection in the pregnant and non-pregnant female or in the puerperal or non-puerperal state. I mention this particularly because the view still held by many, that infection under these conditions differed greatly from ordinary renal infection, has served to greatly delay the diffusion of knowledge of the subject. The sooner we learn to recognize this similarity and to treat the conditions along the same lines, the better will be our end-results.

The first case which I will present today is the wife of a physician who is a primipara in the sixth month of pregnancy. About three weeks ago while visiting her parents in an adjacent city she was suddenly seized with a chill followed by high fever, and this by profuse perspiration. During the next ten days this cycle of chill, fever, and perspiration recurred a number of times. In the absence of any localizing signs a diagnosis of malaria was made, although no plasmodia were found. She was brought to this hospital about one week ago and appeared extremely ill when first seen by me in consultation. Her temperature was 103° F. and pulse 120. Examination of the heart and lungs revealed no abnormal condition. The abdomen was slightly distended. On palpation, there was distinct tenderness on deep pressure over McBurney's point in the right iliac region and also over the right ilio-costal space behind. Neither kidney was enlarged, but the right one seemed to be tender on bimanual examination. The urine contained a moderately large number of pus-cells. Cystoscopy and ureteral catheterization were not done. The diagnosis rested between an acute appendicitis in pregnancy and a right-sided pyelitis. We could easily explain the recurrent cycles of chills, fever, and sweats as being due to a renal infection because such a clinical picture is very common in some cases of pyelitis. The resemblance between similar cycles of rigors followed by fever and sweats without any localizing signs as seen in malaria to those so often seen in pyelitis has given rise to the term "pseudomalarial type of pyelitis" to express the clinical resemblance of these two widely different infections. With the presence of localizing signs such as I have described as being found on abdominal examination it was not deemed necessary to examine the blood for malaria. Another very important clinical difference between the cycles of chills, fever, and sweats as seen in true malaria and those due to pyelitis or to any other forms of pyogenic infection is the irregularity in the occurrence of the cycles in the latter affections. This lack of periodicity is the first guide-post which should lead the careful physician to look for other causes than malaria.

It is not strange that this lack of periodicity of the cycles

of chills, fever, and sweats in our case of pyelitis of pregnancy was overlooked and the diagnosis of malaria erroneously made. The first physician who was consulted thought that every patient with recurrent chills, fever, and sweats must have malaria. Let me digress for a moment to direct your attention to other conditions than malaria and pyelitis which can cause recurrent chills, followed by high temperature and sweats. I will only mention the more common causes of such cycles which are of interest to surgeons.

1. Infection anywhere within the vascular system, for example, a septic phlebitis, whether it be in the peripheral veins, as in the extremities, or in the veins of the broad ligament, or in the veins of the portal system, especially in those within the liver itself, that is, a suppurative pylephlebitis.

2. Infections within the intrahepatic bile-passages to which Charcot gave the name of intermittent hepatic fever on account of the resemblance of the condition clinically to malaria.

To return to our patient, we felt that we could rule out an acute appendicitis because the tenderness over McBurney's point could only be elicited on deep pressure and was localized at a point where the right ureter crossed the iliac vessels. There was none of the muscular rigidity present which one would expect if an acute inflammatory lesion of the right lower quadrant was present. Besides, recurrent cycles of chills, fever, and sweats never occur in acute appendicitis unless an accompanying infection of the veins of the meso-appendix is present with extension into the radicles of the portal vein. The local findings not justifying the diagnosis even of an acute appendicitis, it seemed improbable that such a grave complication as a septic pylephlebitis could be present.

The iliocostal tenderness, the presence of a moderate pyuria, and the fact that these findings associated with recurrent chills and fever are a frequent syndrome found in the pyelitis of pregnancy, led us to conclude that the latter condition was present. We felt that the case belonged to the moderately severe type of the disease, and if it did not respond to expectant treatment that a lavage of the renal pelvis should be done. The bladder

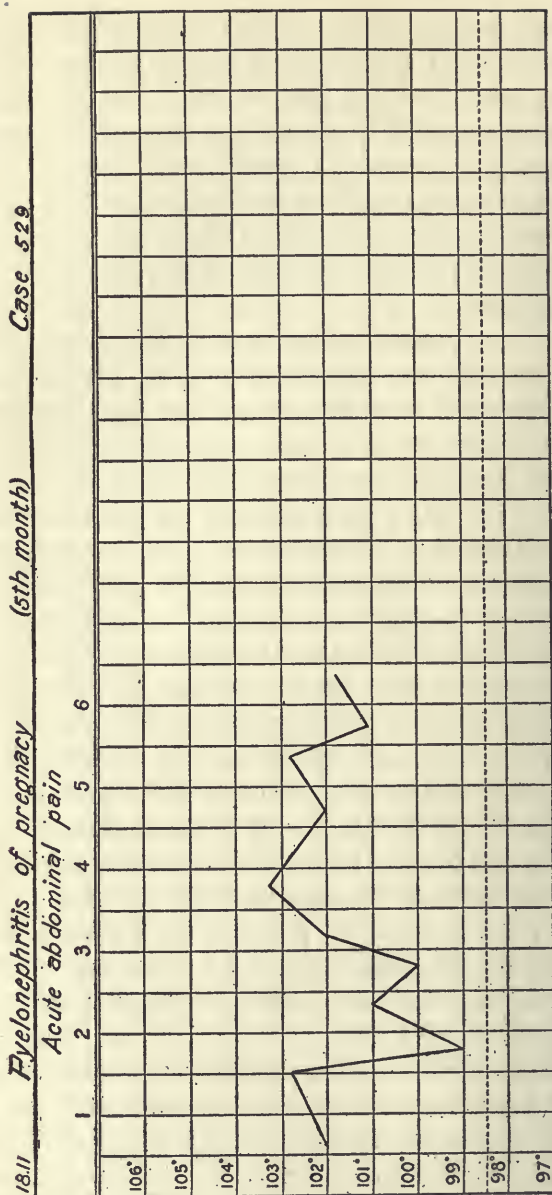


Fig. 371.—Temperature chart from case of pyelitis of pregnancy. The principal symptom was acute abdominal pain following chills and fever which latter occurred before entering the hospital.

was irrigated daily with a solution of 1 : 5000 nitrate of silver which I have found to be very efficacious in the treatment of

non-gonorrheal cystitis. Hexamethylenamin was given in large doses (60 grains daily for two days) and large quantities of water. The prompt cessation of the fever (Fig. 371) and abdominal symptoms was accompanied by the disappearance of the pyuria, and the patient was discharged about a week later.¹

This case belongs to the group of mild or even moderately severe pyelitis such as is quite often seen during pregnancy and in the puerperium.

Pyelitis occurring during pregnancy only differs from the same affection as seen in the puerperium in a few minor details. These are, first, the period at which the infection of the renal pelvis manifests itself clinically, and second, that in pyelitis of the puerperium one must consider infections of the internal genitalia, especially those involving the veins of the broad ligament, in the differential diagnosis of the case. In other respects the two conditions present so many features in common that I will consider them together in our more systematic discussion of the subject.

Pyelitis of pregnancy is believed by many competent observers to be a persistence of an infection of the renal pelvis as seen so frequently in young girls. That a pyelitis of the puerperium is simply a lighting up of a latent condition existing during pregnancy does not require much argument.

The colon bacillus is responsible for over 90 per cent. of the cases, both in pregnancy and in the puerperium. The remaining 10 per cent. is the result of invasion by the ordinary pyogenic organisms, especially the staphylococci. The variation in virulence of different strains of the colon bacillus and the difference in resistance of individual patients explains the clinical observations as to variation in severity of the condition.

The organisms reach the renal pelvis by way of one or more of the following routes: (a) The hematogenous or descending. The organisms enter the general circulation from the tonsils, teeth, intestine, etc., and are excreted into the renal pelvis after passing through the blood-vessels of the kidney; (b) the organisms enter the rich lymphatic network (Fig. 372) of the internal

¹ Pregnancy continued without further recurrence of symptoms or pyuria.

genitalia of the pregnant or puerperal woman and then ascend by way of the lymphatics of the submucous or periureteral coats of the ureter (Fig. 372) to the renal pelvis; (c) the organisms ascend to the renal pelvis along the mucous membrane of the ureter from the bladder and urethra in the female; (d) from the colon directly to the kidney by way of the lymphatics passing directly between these two structures (Fig. 372). It is impossible to determine with accuracy which route is most frequently followed, but I believe that as large a number of cases are due to invasion by way of the lymphatics of the ureter as through the bloodstream.

Infection of the right renal pelvis is far more common than is that of the left—in the proportion of 3 to 1. When both kidneys are involved, the right one is predominantly so. The condition usually manifests itself during the latter half of pregnancy, while in the puerperium it is most often seen during the third to sixth week after delivery.

There is much difference of opinion as to why a pyelitis should occur during pregnancy. Some authors believe that the pressure of the fetal head causes an obstruction of the ureter at the point where this structure crosses the iliac vessels, that is, at the brim of the bony pelvis. Others think that the body of the uterus which is rotated to the right causes such an obstruction. There can be no doubt that the ureters are usually found dilated during pregnancy, and that this causes a slowing up of the urinary stream. We know that any condition which causes such a stagnation favors the localization in the renal pelvis of organisms which are constantly being excreted through the kidneys. Again, you can readily understand how such an organism as the colon bacillus, which has remained latent in the renal pelvis of the female since childhood, can be suddenly aroused to activity under such favorable conditions.

The more persistent the infection, that is, the longer it has lasted, the more advanced are the changes in the form of infiltration of the walls of the renal pelvis and ureter, with its accompanying dilatation of the lumen, to which Braasch first directed our attention. The importance of these chronic inflammatory



Fig. 372.—Diagrammatic representation on the right side of the mode of transmission of infection along submucous lymphatics from bladder to kidney. On the left side is shown in a diagrammatic manner the mode of transmission of infection along the periureteral lymphatics from the internal genitalia of the female to the kidney. Note also communication of the periureteral lymphatics with the lymphatics of the fatty capsule of the kidney.

changes was emphasized in our previous lecture. My only object in speaking of it again is that it explains our inability to cure many of the severe cases of pyelitis, especially in pregnancy and in the puerperium.

The clinical picture of most severe bacteriemia seen in so many of these cases is the direct result of invasion of the bloodstream by organisms from the local area of infection in the renal pelvis. Magoun has recently demonstrated this experimentally in a most convincing manner.

CLINICAL PICTURES

As was explained just a moment ago, the difference in the severity of the clinical pictures is almost always due to a variation in virulence of the causative organism.

One encounters three types clinically, namely: (a) the mild, (b) the moderately severe, and (c) the very severe.

In the mild ones there may be absolutely no symptoms, our attention only being directed to the kidney infection by the persistent pyuria or bacteriuria. You must understand, of course, that there is often no sharp line of demarcation between these three types. A renal infection which has at the onset presented the mildest possible symptoms may suddenly change to a severe sepsis. Before taking up these three clinical pictures under which the pyelitis of pregnancy and of the puerperium presents itself, let me emphasize two findings which vary greatly in individual cases. These are: (a) symptoms referable to the bladder and (b) the degree of evidence of infection as found in the examination of the urine.

I will dwell upon the first one particularly because one encounters so many cases of renal infection in which symptoms such as increased frequency, painful urination, etc., are but little complained of. In fact, even experienced clinicians are apt to be led astray and demand more evidence in the form of bladder irritation before being willing to even consider the urinary tract as the source of the symptoms.

We often see cases of the pyelitis of pregnancy and of the puerperium in which the bladder disturbances attract our atten-

tion at once, while in others these are entirely lacking, as will be seen in the case which I will next present.

This patient is a twenty-year-old primipara. She was confined in this hospital and seemed perfectly well until about the end of the third week of the puerperium, when her present illness began suddenly with a chill, followed by high fever and a sweat. Examination of the internal genitalia failed to reveal any possible cause for the chills and temperature. There were absolutely no localizing symptoms anywhere, especially none referable to the urinary tract, for three weeks after this stormy onset. Blood-cultures were negative throughout this period, during which the cycles of chills, fever, and sweats recurred at irregular intervals (Fig. 373). At one time without any specific treatment the temperature dropped to normal for ten days as suddenly as the cycles of chills, etc., had appeared. Then the clinical picture as unexpectedly became one of a severe type of bacteriemia and a diagnosis made of septic endocarditis. Recurrent chills and high fever (Fig. 373), followed each time by a profuse perspiration and accompanied by an extremely rapid pulse, made the prognosis a very grave one, particularly as no local focus could be found by her attending physician.

When she was first examined I was puzzled as to the underlying source, until it occurred to me that a pyelitis might give rise to such a clinical picture of severe sepsis with slight or even no localizing symptoms referable to the urinary tract. Permission to make a thorough urologic study of the case was obtained, and a cystoscopic examination revealed a reddened and swollen right ureteral orifice, but an otherwise normal bladder. The urine obtained from the left kidney was clear, but that from the right contained in the sediment on staining a relatively large number of Gram-negative organisms which further cultural observation revealed to be a strain of the colon bacillus.

The renal pelvis was irrigated (Fig. 371) with a 1 : 1000 solution of silver nitrate and about 5 c.c. of a 1 per cent. solution left *in situ* before the ureteral catheter was withdrawn. After the first pelvic lavage she had one chill, but after a second one there was an absolute cessation (Fig. 373) of the septic symptoms

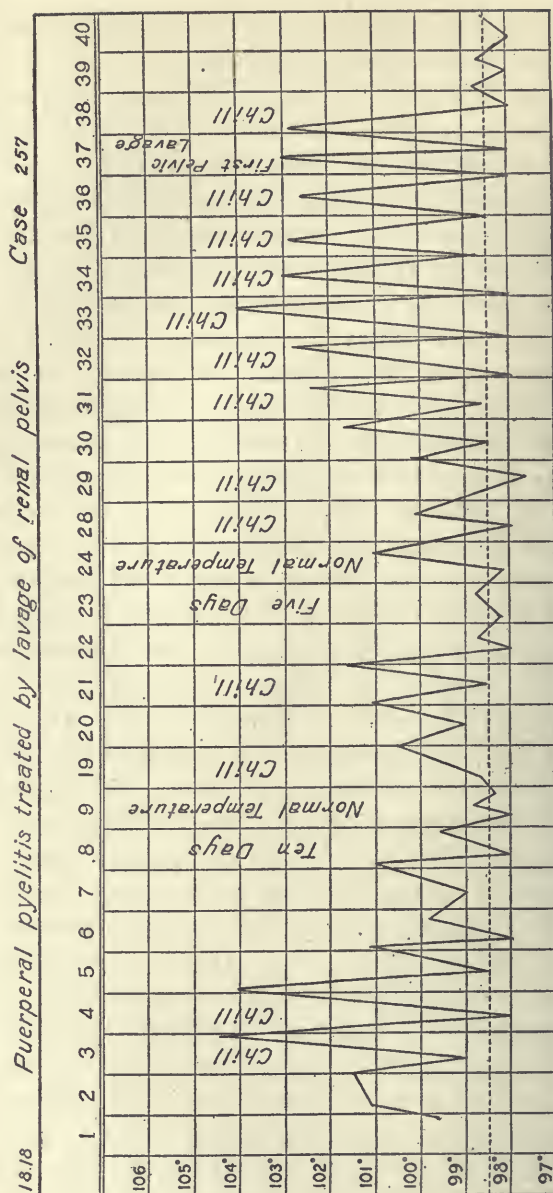


Fig. 373.—Temperature chart from a case of puerperal pyelitis illustrating how the clinical pictures of a most severe generalized sepsis may be caused by an infection of the kidney with practically no localizing signs.

and an uneventful convalescence followed. I have shown this patient because her case illustrates my statement that many

cases of the different degrees of renal infection do not show any bladder symptoms which would lead even the most thorough observer to consider some affection of the urinary tract as the source of the symptoms.

The second point which I have tried to emphasize today, namely, that a relatively clear urine does not exclude the possibility of an infection of the upper urinary tract, is equally well illustrated by this case. Ordinary microscopic examination of the urine will often give no clue to the presence of such an infection. There may be an absence of pus for days or the urine may only be cloudy from the presence of a large number of bacteria, a condition called bacteriuria. It is only by repeated study of the mixed urine (that is, from the bladder) or, better still, by staining the sediment after prolonged centrifugalization of the urines obtained from each kidney by ureteral catheterization, that a positive diagnosis can be made. I might mention here that this is the only reliable method to determine whether the infection of the renal pelvis has been cured. Cultural study is becoming less frequently employed at the present time than staining of the sediment.

It scarcely seems necessary to describe in detail the symptoms of the mild, moderately severe, and very severe types of the pyelitis of pregnancy and the puerperium. They differ only in degree. In the milder form there may be a moderate rise in the temperature and pulse-rate, or these may be normal. Back-ache or more localized pain and tenderness over a single kidney or referred to the lower abdomen may be the only symptoms which attract our attention. As I have just stated, the urine may not enable us to confirm our diagnosis of a pyelitis.

In the moderately severe cases the clinical picture is very much as in the case of pyelitis of pregnancy which I presented at the beginning of our clinic. The pain and tenderness over one or both kidneys and in the lower abdomen, especially over McBurney's point on the right side, are, as a rule, more marked. In pregnancy we must consider salpingitis, appendicitis, twisting of the pedicle of an ovarian cyst or dermoid, or even an acute cholecystitis in the differential diagnosis. The fever is usually

of the remittent type, but may be continuous. Recurrence of the high temperatures may or may not be preceded, as was seen in our patient, by a chill.

During the puerperium the first thought is that an infection of the uterus and adjacent structures has occurred, but this can be ruled out in the majority of cases. One is apt to be led astray in some patients, however, upon bimanual examination by the presence of a localized area of tenderness in the broad ligaments, because such an increased sensitiveness may be due to an enlarged and inflamed ureter, which is often to be felt as a tender cord. Colics and profuse hematuria are not frequently seen in these cases, but the possibility of the occurrence of such symptoms must not be forgotten in every form of renal infection.

In the very severe form symptoms which direct our attention to the kidney retire more and more into the background. The clinical picture, as in the case of pyelitis of the puerperium which I have just presented, becomes more and more that of a severe bacteriemia without localizing symptoms unless a pyonephrosis or a perinephritic abscess develops.

TREATMENT

The treatment of pyelitis of pregnancy and of the puerperium has been completely revolutionized since Stoeckel showed that it is possible to abruptly terminate the majority of the cases, especially the more severe ones, by lavage (Fig. 374) of the renal pelvis. More recently Caulk and others have shown that provision for free drainage of the infected renal pelvis through the employment of the ureteral catheter alone suffices to accomplish the same results as lavage if the pelvis is not dilated too much.

That spontaneous recovery will take place in many cases without the application of these two therapeutic methods cannot be denied, and I cannot urge you too strongly to give the so-called expectant methods a trial before lavage or ureteral catheterization alone are used. On the other hand, there is but little indication to terminate pregnancy until the more recent methods just mentioned have been given a thorough trial.



Fig. 374.—Diagrammatic representation of method of performing pelvic lavage for pyelitis. The ureteral catheter shown in black passes up to the pelvis of the kidney, where the solution used for pelvic lavage is deposited directly upon the affected mucous membrane of the renal pelvis.

By expectant treatment I mean rest in bed as much as possible, drinking of large quantities of water, a bland diet, and the administration of urinary antiseptics in as large doses as the patient will tolerate. You may think that I am rather radical when the statement is made that the administration of drugs or special waters to render the urine either acid or alkaline is not any more efficacious than the simple dilution of the urine by drinking water freely. I have seen equally good results by this simpler method, and Graff in a recent article on the entire subject of renal infection has expressed a similar opinion.

Local treatment of the bladder in the form of irrigations is of little benefit.

One must not forget that even though the symptoms have subsided, the infection in the renal pelvis may become latent, only to recur in future pregnancies or, as in our second case of today's clinic, at a later period of the puerperium.

The following factors are not to be overlooked in both the expectant method of treatment as well as in the more direct one:

(a) There may be an obstruction present in the ureter, for example, calculus, stricture, twist, etc.

(b) The pyelitis may have existed for many years and resulted in changes in the wall of the ureter and of the renal pelvis, with the resultant dilatation of the lumen to which I have directed your attention in my first clinic on renal infection.

(c) Some of the strains of *Bacillus coli* and especially staphylococci are very resistant to bactericidal agents.

If lavage of the renal pelvis or simple passage of a ureteral catheter has not been successful, one must always bear in mind the possibility of the existence of one or more of the above causes.

Now as to the more direct methods, these are indicated (a) in every case where the more conservative treatment has failed, (b) in the more severe types without losing any time in the employment of less radical measures. Those who are interested will find reports of a relatively large number of cases so treated, with success. The termination of pregnancy was quite frequently avoided. When pelvic lavage or ureteral catheterization has

been begun, it should be continued until negative smears or cultures have been obtained, because a recurrence is very likely to take place unless a complete cure is possible. The prognosis should always be guarded if only a cessation of symptoms has occurred.

For lavage of the renal pelvis nitrate of silver surpasses in efficacy all other remedies. I first irrigate with a 1 : 1000 solution and then use stronger ones up to 2 per cent.

I have had no personal experience with catheter drainage alone, but Caulk speaks of it very highly, and believes that it will cure all except the cases where the renal pelvis and ureter are dilated as the result of long-standing infection. A single treatment may suffice in the majority of cases to produce a symptomatic cure, and even the pyuria may cease, but, as was just stated, one should continue treatment if possible until a bacteriologic cure has been obtained. If the symptoms of severe sepsis continue in spite of pelvic lavage or simple catheter drainage, do not fail to look for some obstruction in the ureter or for a possible complication in the form of a pyonephrosis or a perinephritic or periureteral abscess. Our first case of today thus shows the possibility of symptomatic cure in a moderately severe case of the pyelitis of pregnancy by conservative, that is, indirect methods, and of a rapid and almost theatrically striking cure in the second case by the more direct methods.

CLINIC OF DR. HERMAN L. KRETSCHMER

PRESBYTERIAN HOSPITAL

ELUSIVE ULCER OF THE BLADDER

Summary: A rare bladder lesion—etiology, pathology, diagnosis, and treatment. Resemblance to tuberculosis of the bladder. Presentation of patient previously operated for elusive ulcer of the bladder.

To Hunner, of Baltimore, belongs the credit for having called attention to and for having devised a form of treatment for a rather unusual type of bladder lesion. This lesion Hunner has called, for want of a better name, "elusive ulcer," using this term because these patients have gone about with a lesion unrecognized and undiagnosed. Recently Keene has suggested the name of "circumscribed panmural ulcerative cystitis," believing that this better describes the lesion than the term suggested by Hunner.

Nitze, in his book on Cystoscopy, describes a lesion which apparently is similar to the one described by Hunner, under the name of "parenchymatous cystitis."

Hunner has called attention to the fact that he has met this lesion only in women, and that these women have usually been subjected to operations without relief, and have been subjected to various forms of bladder treatment without relief, after which they were usually put into the discard as "neurotic bladders."

The patient that I wish to present is one in whom a diagnosis of elusive ulcer was made and upon whom I operated. There are several interesting features in this patient's condition, and before demonstrating her I wish to briefly go over her history, which is as follows:

Previous history shows that she was cystoscoped four years ago and no diagnosis made. One year ago she was examined roentgenologically and a diagnosis of tuberculosis of the kidneys and bladder made. The patient has never been pregnant and

there is no history of miscarriages. Menstruation is very painful and of five days' duration.

Present Illness.—Her chief complaints are:

1. Painful urination.
2. Frequency of urination.
3. Pyuria.
4. Hematuria.
5. Pain in the back.

Onset.—Four years ago without apparent cause she began to note that she was obliged to void more frequently than had been her custom. Associated with the frequency of urination there was painful urination. These two symptoms have progressively become worse, especially so during the past two years, until now the trouble is very severe, causing her to be very nervous and very weak. The pain is described as like a toothache. It occurs during the act of urination and is associated with severe spasm at the end of urination. The pain is located at the neck of the bladder. The frequency of urination has progressively increased from four to five times during the day to every half-hour. At night she formerly voided once or twice, but at the present time she is obliged to void eight times.

Pyuria.—The patient states that since the onset of the trouble the urine has been cloudy and contains fine flesh-like shreds.

Hematuria.—The patient has occasionally noticed a little blood in the urine, staining the night clothes. The last time she noticed the blood was two months ago. She has never passed clots nor at any time has the urine been wine colored.

Pain in Back.—This is located in the lumbar region on both sides and is described as a dull ache associated with urination. At times she experiences twinges of sharp, needle-like pains in the kidney region and over the bladder.

General.—The patient has lost 10 pounds in weight during the past two years. Her appetite is fair. The bowels move daily, causing spells of severe pain in the bladder.

Physical Examination.—The patient is a pale, anemic looking, nervous individual. Head and neck are negative, as are also the heart and lungs.

Pupils react to light and accommodation. The knee-jerks are exaggerated.

Abdomen.—The lower pole of the right kidney is palpable. The left kidney is movable (first degree). There is tenderness along both ureters, which is especially marked over the bladder.

Roentgen ray examination is negative for the presence of stone in the urinary tract and also for bone changes.

Because of the history a careful search was made for tubercle bacilli, and many catheterized bladder specimens were examined without being able to demonstrate the tubercle bacilli.

Cystoscopic Examination.—This was very difficult, so that it was necessary to give her a little gas. In the apex of the bladder was seen an area of superficial ulceration surrounded by a zone of hyperemia. A small shred of mucopus was seen adhering to the surface of the ulcer. The neck of the bladder and the ureteral orifices were normal. The ureters were catheterized without difficulty or obstruction. Examination of the separated urines showed the following:

	Cell counts.	Cultures.	Tbc. examination.
Bladder	1080	Sterile	Negative
Right kidney	1420	"	"
Left kidney	160	"	"

In order to exclude tuberculosis guinea-pigs were inoculated with the urine from the right and left kidneys and bladder. At the end of six weeks the three pigs were autopsied and failed to show the presence of tuberculosis. Two subsequent examinations of the bladder urine obtained by catheter showed the following:

	Cell counts.	Cultures.	Tbc. examination.
First examination	400	Sterile	Negative
Second examination	250	"	"

Not being satisfied with obtaining one set of negative guinea-pigs, it was decided to inoculate another set. Cystoscopic examination was again carried out under gas, and showed practically the same findings as were demonstrated at the first examination. The ureters were catheterized without difficulty or obstruction. Examination of the urine showed:

Bladder	}	Negative for tuberculosis.
Right kidney		
Left kidney		

A second set of guinea-pigs were inoculated with urine obtained at this cystoscopic examination. These guinea-pigs failed to show the presence of tuberculosis.

Hunner, in his article, says that he suspects elusive ulcer in patients who have a history of frequent and painful urination, in whom the urine is clear and the sediment shows a few leukocytes and red blood-cells. It will be seen from the examinations made of the urine obtained from ureteral catheterization that the findings in this case do not tally with Hunner's findings, inasmuch as every specimen of urine examined showed the presence of a small amount of pus. Because of this fact we were at first somewhat skeptical about making a diagnosis of elusive ulcer. However, having ruled out tuberculosis, it seemed to me that the only diagnosis one could make was that of elusive ulcer. The cystoscopic findings seemed to tally closely with the cystoscopic findings reported by Hunner, and the patient was advised to consider surgical treatment.

As has been pointed out by Hunner, nothing short of a radical operation gives these patients relief. The patient consented to operation, which was carried out under ether anesthesia. The usual suprapubic incision was made and the peritoneum dissected from the bladder. There was a good deal of difficulty in removing the peritoneum just behind the apex of the bladder. The peritoneum was apparently bound down by an inflammatory process, as a result of which the peritoneum was accidentally opened. This was immediately closed with a fine catgut stitch without any consequence thereof. After the peritoneum was freed the wall of the bladder felt thick, hard, and indurated. After the peritoneal dissection was completed the bladder was opened by a median incision. At the junction of the apex of the bladder with the posterior superior wall there was seen an area of ulceration about 3 to 4 mm. in diameter. This was surrounded by a distinct area of hyperemia. A small amount of edema was seen. It was then decided to carry out a resection of the

ulcer-bearing area of the bladder. This was done by means of scissors. After controlling the bleeding points from the cut margins of the bladder the bladder was closed with interrupted catgut sutures. The mucosa was not included in the sutures. A rubber drain was inserted into the bladder for drainage. A small strand of gauze was placed in the space of Retzius and another gauze wick was placed between the bladder and the peritoneum. The gauze drains were removed at the end of forty-eight hours. The rubber tube was removed on the fifth day.

Histologic examination of the ulcer-bearing area showed the presence of an ulcer in the mucosa. A good deal of hemorrhage was present. In the submucosa were seen large areas of dense round-cell infiltration, which apparently decreased in density from the center out. There were also seen some areas of hemorrhage. The muscle-fibers were not involved in this process to the same degree as the submucosa, but there were occasionally seen areas of round-cell infiltration and hemorrhage. A large amount of new blood formation was found in the submucosa.

Examination of the abdomen today shows the presence of a suprapubic scar which is perfectly healed. Since the operation the patient has been absolutely free from pain both between urinations as well as at the time of urination. As a result of the wide resection there is a definite diminution in the bladder capacity so the patient does not at this time void a normal amount of urine. The intervals between urinations have been markedly increased, so that at the present time she is obliged to void only two or three times at night and every two or three hours during the day.

Nothing is known of the etiology of this condition. Hunner has thought of the possibility of focal infection, and in the cases in which he attempted to find foci of infection he was unable to definitely establish a connection between them and the production of ulcer. Examination of our patient for the presence of foci of infection has been negative. One factor in the etiology that has been brought out up to this time is that all or nearly all of these cases have occurred in women. There seems to be no connection between the lesions of the gynecologic tract and the

production of this type of ulcer. Pregnancy does not seem to play a rôle.

The two symptoms of which most of these patients complain are frequency of urination and painful urination. Hunner says whenever he sees a woman with frequency and painful urination, clear urine, and sediment showing a few leukocytes and a few red blood-cells, he makes a provisional diagnosis of so-called elusive ulcer. That elusive ulcer may occur with the presence of a large amount of pus has been demonstrated by this patient. Not only did this patient have a large amount of pus in the bladder urine, but the leukocyte count on the urine showed pus-cells both in the right and left kidneys. Because of the presence of pus in the sterile urine associated with areas of ulceration it just occurs to me that some of these patients are mistaken for cases of urinary tuberculosis. The fact that we suspected that this patient had tuberculosis of the urinary tract is evident because we lost two sets of guinea-pigs in order to definitely exclude urinary tuberculosis.

With reference to the treatment there seems to be only one form of treatment that offers these patients any chance for relief, and this is wide resection of the ulcer-bearing area. Fortunately, in most of these cases the ulcer-bearing area is located in the apex of the bladder or in a part of the bladder that can be resected very easily. Should the ulcer be located along the ureteral orifice it would, of course, necessitate a transplantation of the ureter.

Prognosis.—With reference to cure, if these patients are operated upon, the outlook for cure is very good, but in order to obtain this prognosis, as stated above, it is necessary to resect very widely the ulcer-bearing area. The cases so far reported in the literature have been too scant to permit of any statements regarding recurrence.

Postscript.—A recent report from this patient states that she is free from pain for the first time in four years, and that the frequency of urination has practically disappeared. She now urinates at normal intervals.

CLINIC OF DR. EDMUND ANDREWS

MERCY HOSPITAL

LARGE STRANGULATED UMBILICAL HERNIA

Summary: Sudden strangulation of an umbilical hernia that had been present for fifteen years without producing any symptoms. Operation revealed a multilocular sac. Resection of adherent omentum and cure of the hernia. After-treatment in patients who are markedly obese.

THE patient is a colored woman, aged about forty-five, who has had an umbilical hernia for about fifteen years. It began as a small mass that appeared only on straining, was never painful, and gradually increased in size. For the last ten years it has always been out when she was up and about, but disappeared during the night. There never has been any pain, but at times a slight feeling of heaviness was present. She has never worn a truss or support of any kind, in spite of the fact that she has always done hard manual labor. About six months ago she had an attack of vomiting and pain in the abdomen which lasted three hours and disappeared without any treatment.

At 2.00 A. M. this morning she was taken suddenly with a severe pain in the abdomen, not well localized, and violent nausea and vomiting. She was seen at that time by Dr. F. M. Drennan, who was able to reduce the hernia with very little pressure. He was called again, however, at 7.00 P. M. and found that the symptoms had not been relieved, and immediately made the diagnosis of reduction *en masse* with strangulation and sent her into the hospital for operation.

The patient is an extremely obese colored woman, apparently in acute pain and in a marked degree of shock, with temperature 100° F., pulse 120, and respirations 30, short and catchy. The findings are negative except for the abdomen, which is extremely

fat and pendulous. At and above the umbilicus is a swelling as large as an adult's head. There is a marked impulse on coughing. Careful percussion over it gives no tympany at any point. There is only slight tenderness to touch. The skin is extremely thin over the mass and is freely movable on it. By gradual gentle compression the entire mass, which is soft and nodular, can be returned to the abdomen. The outline of a ring about 3 cm. in diameter can be felt just above the umbilicus, and in the umbilicus itself is a cord-like mass about 2 cm. in diameter, which is irreducible. The rest of the abdomen is of board-like rigidity.

A previous similar reduction by Dr. Drennan did not relieve the symptoms, so it is evident that we are dealing with a strangulated umbilical hernia which is reducible *en masse*. The indications are for immediate operation. The lack of tympany over such a large tumor makes it probable that the contents are mostly omentum, but does not absolutely rule out the possibility of a strangulated piece of bowel. A point more against this is the fact that the pain and vomiting are not excessive, as one would expect if the bowel were gangrenous. If it is bowel, I know it is not the colon because she has passed a large amount of gas per rectum. The transverse colon is the usual organ found in these herniæ. The board-like rigidity of the abdomen, however, points unmistakably to the fact that some intraperitoneal organ is compromised.

During the struggles under ether the hernia has again protruded. I will leave it so. An elliptic incision about 5 inches long is made to include the umbilicus. In this case the incision is made longitudinal instead of transverse, as is usual in the Mayo operation, because of the likelihood of having to enlarge the ring and resect a piece of intestine. In that case I would rather cut in the midline and then close by overlapping from side to side.

The elliptic flap of skin except a pedicle at the umbilicus is now excised, the skin at the margins of the wound dissected back, and the sac freed without opening it. It is now incised and proves to be a multilocular one, as is usual in these cases. Ten or twelve locules are opened and each contains omentum adherent

to the inside, and in several it is markedly edematous. One loop of jejunum is found in the largest cavity. It is dark and cyanotic and has a few slight subperitoneal hemorrhages. Its viability is doubtful and I will return it to the abdomen and examine it again later, then deciding if it will have to be resected. There is a small amount of clear fluid in the abdomen and in several of the loculi I find some bloody fluid. Several attempts are made to free the omentum from its almost universal adhesions to the interior of the multilocular sac, but as this is consuming much time and the condition of the patient is very bad, her pulse having gone from 120 to 150, a more rapid means is sought. The transverse colon is pulled out and the entire pedicle of the omentum ligated in three ligatures and severed. The whole of the omentum lay in the sac and was almost universally adherent. Next the whole sac and omentum is rapidly cut away right down to the ring, there being very little hemorrhage. Then the cord, mentioned above, leading to the umbilicus is incised and found to contain adherent omentum and a little bloody fluid, being a separate hernial sac. This also is freely excised.

The opening is now enlarged upward in the midline for about 1 inch and the two holes cut into one. This makes it possible to introduce the hand into the abdomen, and nothing is noted except a few small fibroids in the uterus. The injured bowel is now examined and seems to be recovering nicely. There are two small hemorrhages on it and one in its mesentery.

The closure is made by pulling the left side under the right with three mattress sutures of heavy kangaroo tendon. This secures about 1 inch of overlapping. The free edge is now sewed down with a continuous locked stitch of somewhat smaller kangaroo tendon. A running plain catgut stitch in the subcutaneous fat and a few interrupted in the skin complete the operation. A folded gutta-percha is left under the skin. This is necessary not only to take care of any oozing of blood but also because all strangulated hernia wounds are potentially infected.

Such a radical procedure as the resection of the entire omentum may be questioned. I believe it was justifiable here on account of the great amount of time it saved. The operative

mortality of all strangulated herniæ is about 50 per cent., and in such large umbilical ones much higher. The shock is always great and the need for haste most urgent. In this case the pulse was 120 to begin with and rose to 160 during the operation. The patient received 2000 c.c. normal salt solution under the breasts during the operation. If I had dissected the omentum



Fig. 375.—Sagittal section showing relation of hernial sac and contents. Dotted line shows point of amputation of omentum.

free from the sac, it would have consumed a great deal of time. Such a long and tedious dissection, involving as it must a serious loss of blood, might well have been fatal. Also, the omentum would have been left with an enormous number of ligatures on it, and it was curled up into a ball, and not a typical thin sheet. As it was, its rapid removal enabled me to get through in seventy minutes. The same may be said of the method of closure. It

would have been better to have opened both rectus sheaths, and sewed the anterior and posterior sheaths and muscle separately, but the method used was quicker, and speed seemed very necessary.

Postoperative Course.—While coming out of the anesthetic the patient struggled violently, tearing part of the bandages and pulling out the drain. It was not reinserted, but four days later a probe was introduced and some secretion drained off. This discharge continued for about three weeks. Except for this, her convalescence was uneventful and she left the hospital at the end of three weeks. A firm binder was ordered to be used while she was up and about. One of the most important points in the after-treatment is the diet. It is absolutely essential that we get rid of a lot of the fat. Unless the intra-abdominal pressure is reduced by this means, a recurrence is sure to come. It is not our usual custom to provide a truss for these cases, but until a great deal of weight has been lost I think it safer to use it in this case. When, however, her enormous adiposity has been reduced to more moderate proportions the belt should be discarded.

CLINIC OF DR. VERNON C. DAVID

PRESBYTERIAN HOSPITAL

TREATMENT OF ACUTE SUPPURATIVE ARTHRITIS OF THE KNEE-JOINT

Summary: Streptococcic arthritis of knee-joints coming on during the final stage of a bronchopneumonia. Method of handling infected knee-joints in military hospitals applicable to civil practice.

THE patient about to be operated upon was transferred to the surgical department with the following history:

He is a white male, forty years old, who worked as a laborer until three weeks ago, when he was obliged to stop work on account of an acute bronchitis which was associated with fever, pain in the chest, and some dyspnea. From the history he might easily have had a bronchopneumonia. He entered the hospital a few days ago because of bilateral swelling of the knees and legs below the knees, which trouble began just as his pulmonary lesion was subsiding. The swelling of the knees was acute in onset and was associated with marked pain on movement and complete inability of locomotion.

The patient looks ill and complains of pain in both extremities. His temperature is slightly elevated and his pulse-rate varies from 100 to 110. On examination of the chest a few râles are heard over the base of both lungs, but there is no evidence of consolidation. The urine is negative and the leukocyte count is 14,000. Both knees are markedly swollen, though the skin is not reddened. On both sides the patella floats and the quadriceps bursa is so distended that it can be plainly outlined up to the lower third of the thigh. Below the knees the legs and ankles are swollen and the ankles are painful on motion, but no fluctuation is present over them and the skin is not hyperemic,

but pits easily on pressure. An aspirating needle attached to a Luer syringe was inserted into each knee-joint, starting high up along the outer aspect of the knee and inserting the needle very obliquely under the patella. On both sides a creamy

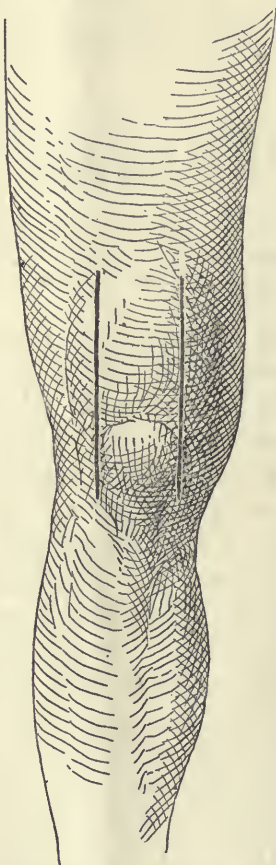


Fig. 376.—Diagram of swollen bursa showing parallel lines of incision.

yellow pus was withdrawn, which on culture proved to be *Streptococcus hemolyticus*. We have, then, a bilateral hematogenous infection of both knee-joints with the *Streptococcus hemolyticus*, and we will now discuss the character of surgical treatment to be instituted.

Before the war it was fairly common teaching to advocate complete immobilization of infected joints after drainage, and following this dictum the end-result was practically always ankylosis. Due principally to Willems' work a radical change in the treatment of infected joints was instituted during the war. Willems advocated thorough drainage of the infected joint followed by immediate mobilization and movement of the joint by



Fig. 377.—Photograph of patient showing healed scars of incisions made for the treatment of suppurative arthritis of the knee-joints.

the patient's own efforts and not by passive mobilization by the surgeon's or attendant's efforts. He contended that by this method of treatment better drainage of the joint was effected and much better function of the joint obtained than by other methods of treatment. In 1918 he reported 20 cases of infection of joints, 13 of which had practically normal motion after being treated in this way. Willems not only insists on immediate

active motion of the joint after operation, but in his knee-joint infections he has the patient walk on the leg, and at every flexion and extension of the joint pus is squirted out of it. This method was used wherever possible in the American hospitals in France, where infections of the joints not infrequently followed gunshot wounds of the joints. Where oblique fractures of the shaft of the tibia or femur entered the joint it was manifestly impossible



Fig. 378.—Photograph taken after operation showing degree of flexion in both knees.

to begin active motion of that extremity, but where *débridement* of the joint had been done and the loose fragments of bone removed, active motion of such joints could often be instituted. We were able to begin active mobilization of five infected knee-joints which we were obliged to drain after gunshot injury of the joints. At the end of an average of forty-five days two joints had practically normal motion and all had 20 degrees or more of active flexion. The joints that were immobilized after drainage

because of previous immobilization of the joint, extensive peri-articular infection, large wounds of the soft parts in the region of the joint, or fracture of the shaft of the tibia or femur into the joint, had an average range of motion of less than 10 degrees of active flexion after three months.

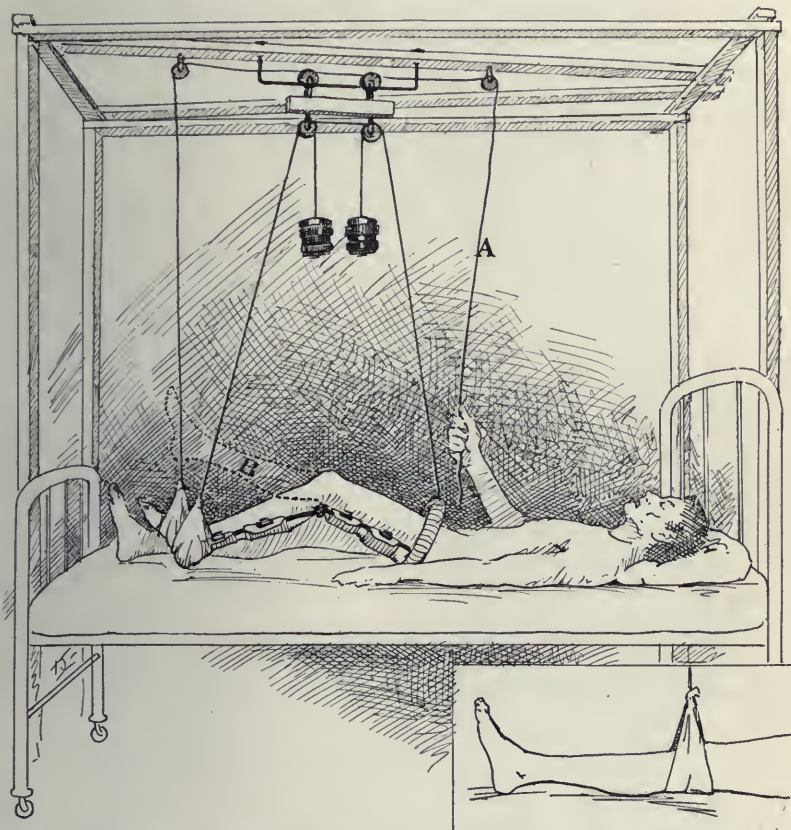


Fig. 379.—In order to extend the leg for active motion the patient may by traction on the rope (A) extend the leg as in B.

In the patient we have for operation this morning we shall make a long parallel incision on both sides of the patella, starting just below the inferior border of the patella and extending to the upper limit of the quadriceps bursa. Each incision is about 8 inches long. The blood-vessels in the cut quadriceps muscle

are caught and ligated and into each wound a long strip of vaselined gauze is inserted to prevent the recently cut skin edges from adhering to each other and thus obstructing drainage. No drainage material of any kind is put into the joint. A gauze dressing is placed over the wound and a towel is slipped under the knee and loosely pinned over this dressing. On subsequent dressing the towel will be unpinned and the edges laid back, obviating the use of bandages, which are hard to apply in this particular case. The knees are each supported in a Hodgen splint, which is slightly bent (15 to 20 degrees) at the knee, and both splints are suspended on a Lyle frame and counterpoised, so that the patient can raise himself up and down without bending his knees. With both knees drained, as in this case, it is impossible to have the patient up and about, so he is carefully instructed as to the value of active efforts on his part to move the joints. It is desirable to obtain 20 degrees of flexion and full extension of the knees at least four times a day. To facilitate the motion in this case, where the patient is weak and does not understand the situation any too well, we have attached adhesive plaster to the sole of each foot which runs to a pulley on the frame by means of a rope. This rope is then run through another pulley just above his head, allowing the rope to fall into the patient's hand. By pulling on the rope the knees are extended in the Hodgen splints.

NOTE.—In ten days the knees were taken out of the splints and allowed to rest on the bed. The adhesive was removed from the soles of the feet, and the rope upon which the patient pulled to exercise the knees was attached to a canvas which ran under each knee. Traction on the rope caused flexion of the knee. At the end of three months the patient had about 40 degrees of flexion and full extension of both knees.

CLINIC OF DR. HUGH McKENNA

ST. JOSEPH'S HOSPITAL

SPINA BIFIDA—CLOSURE OF DEFECT BY FLAP OF CARTILAGE AND BONE

THE patient we have for operation this morning is a little girl nine months old, who was admitted from an infant asylum, so that it is impossible to get any information regarding the parents. The patient was referred to my service by Dr. Charles Schott, head of the Pediatric Department.

As you will note, the child is in good general condition and a perfect specimen physically aside from the tumor situated at the lumbosacral junction. Examination reveals a soft, fluctuating mass about the contour and size of half of a small apple. Over the lower half of this mass is a cartilaginous or bony protuberance, the base of which appears to hinge on the posterior surface of the vertebra just below the base of this tumor. The superficial part of this protuberance is movable.

In making a diagnosis one must take into account that the anatomic site, the lumbosacral region, usually shows a spina bifida of the meningocele type.

I am making a curved incision through the skin and fat down to the sac. I find that the sac is made up of a very thick layer of fat that protrudes from the cleft in the vertebra and shows a definite line of cleavage between this layer and the surrounding superficial fat. I am now denuding the sac of the overlying fat, and I find that after the removal of this fat the sac slips back into the canal with ease. The unyielding substance previously described as making up a part of this tumor proves to be a semi-bony and cartilaginous flap that apparently has failed during the embryologic stage to close in its upper margin. By utilizing this flap I am able to get a very firm closure without much fear of recurrence. I am, therefore, going to drop the prepared sac

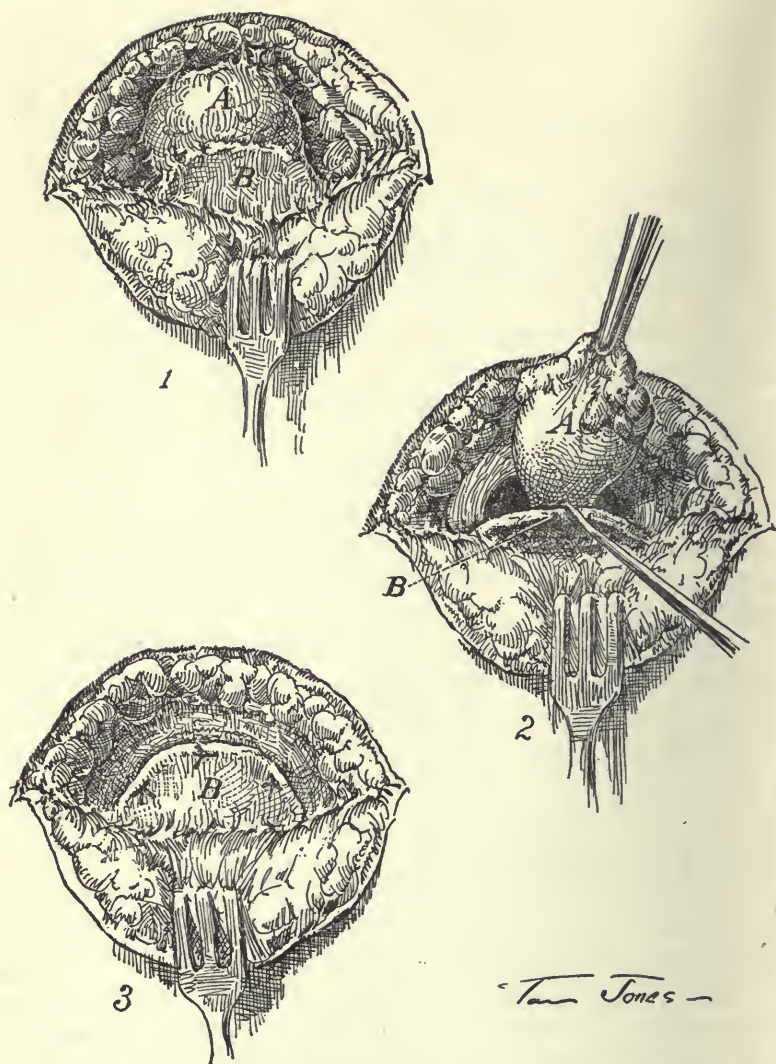


Fig. 380.—1, Sac exposed (A) with overlying cartilaginous flap (B). 2, Sac (A) freed from flap (B) and ready to be dropped back into canal. 3, Flap (B) completely covering defect and sutured to vertebra by three mattress sutures.

back into the canal without opening it, as this procedure will lessen the danger of the operation from the standpoint of infection. The sac drops back freely enough to assure me that it will cause

no symptoms from pressure on the nerve structures. I am now filling the bony cleft of the overlying soft tissues in order that I may approximate the flap, which has been prepared, to this denuded surface with the hope that a bony union may take place, thereby rendering the defect caused by the spina bifida permanently repaired. I am securing the flap to the vertebra by means of chromicized catgut, putting in three mattress sutures, which I find make an accurate approximation. I am closing the wound in the ordinary way.

The patient will be placed upon her stomach to prevent unnecessary pressure over the wound.

Note.—The patient has been observed over several months, and her recovery has been uneventful.

CLINIC OF DR. CARL BECK

NORTH CHICAGO HOSPITAL

TUBERCULOSIS OF APPENDIX AND BOTH ADNEXÆ

Summary: Primary tuberculosis of the appendix with extension to tubes and ovaries. Cure by removal of appendix and adnexæ, with subsequent x-ray treatment.

THIS patient is a married woman, thirty-three years old, who comes to us because of progressive general weakness and loss of weight. She has never been pregnant nor have there been any miscarriages. Menstruation is irregular. Examination shows normal heart and lungs. There are no abnormalities in the abdomen except in the genital tract. She has a whitish discharge from the vagina. The uterus is tender and retroverted. The left ovary and tube are enlarged and very sensitive. The right side seems to be free, but there is considerable resistance of the muscles on this side. Clinical examination supplemented by fluoroscopic examination shows no abnormalities in the stomach or intestines. The appendix region is not painful or tender. Urine examination is negative. Considering the pathologic conditions of the adnexæ, we have made a tentative diagnosis of tuberculosis of the genital tract.

We are making the usual laparotomy incision. On opening the abdomen the peritoneum and intestine show no evidence of a pathologic condition. The appendix, however, presents a most remarkable appearance. It consists of two parts, a proximal and a distal. These two portions are separated by a defect, as though one-third of the appendix had been resected (Fig. 381). The distal portion is swollen and filled with a cheesy material. On its outer surface are a few tubercles (Fig. 381, *B*). Both ovaries are considerably changed. They are covered with

tubercles, the left one more so than the right. There are some tubercles on the tubes.

The tuberculosis was apparently primary in the appendix. The central portion of the tubercular appendix sloughed, emptying its contents over the surface of the ovaries and tubes. Gradually some of these tubercle bacilli have found their way into the tubes. The uterus appears normal and, therefore, we shall not resect it. We are removing the appendix and the



Fig. 381.—Shows unusual appearance of appendix. Note defect (A) which divides the proximal (C) and distal (B) portions as if the middle third had been resected. Note tubercles on distal portion.

adnexæ in the hope that a cure of the tuberculosis may take place. We close the abdomen in the usual manner.

As soon as the patient recovers sufficiently from the operation *x-ray* treatments will be instituted. We have had a number of cases of tuberculosis of the genital tract and the appendix which have remained permanently well after removal of the appendix and adnexæ and subsequent *x-ray* treatment.

After-history.—The subsequent result in this case proved that we were correct in our assumption. The patient recovered

rapidly from the operation. By the end of four weeks she had gained 20 pounds. The pains in the abdomen and general symptoms disappeared. She was given x-ray treatments during her convalescence. We believe the x-ray treatments not only accelerate recovery, but in some cases produce a permanent cure of the tuberculosis.

ARTERITIS OBLITERANS

Summary: Arteritis obliterans a disease peculiar to people of the Jewish race coming from Russia, Hungary, and the Balkan States. A successful method of treatment.

THIS man is a Russian Jew, thirty-eight years old, and a tailor by trade. For a number of years he has been suffering from pain in his feet. A number of sores have developed on the toes. On the right side the ulcerated condition is confined to the great and second toes, while on the left side a good-sized portion of the great toe has grown to the second toe, the largest portion of which has sloughed out. The fourth and fifth toes on the left foot are considerably affected. The ulcers are yellow in color and covered with a scum. They are discharging a small quantity of pus and some portions of the bones are distinctly protruding. The circulation of the toes and feet is very poor. Both feet are slightly bluish in color and the skin is thin, atrophic, and dry.

The radiograph of the left foot shows destruction of the first phalanx of the great toe, almost total destruction of the second toe, and considerable change in the third and fifth toes. On the fourth toe the destruction reaches down into the metatarsal bone. The radiograph is very interesting because it shows the lack of calcareous material in most of the phalangeal bones and a great deal of atrophied bone in those which are not destroyed.

The radiograph of the right foot shows an absence of a considerable portion of calcareous material. Most of the phalanges are atrophied, very much thinner than they ought to be.

General examination shows the patient otherwise healthy. He has no defects or sickness of any kind.

He has had all kinds of treatment, local applications of every description, and even some surgical treatment.

This condition is known as arteritis obliterans. It occurs particularly in people of the Jewish race coming from certain



Fig. 382.—1. Photograph showing the extent of destruction of the toes. Note the deep ulcer on the left great toe. The second toe is almost completely destroyed and the fourth toe is missing. On the right foot there is an ulcer on the side of second toe. 2, Roentgenogram of left foot showing the pathologic changes. The first phalanx of the great toe has been destroyed by the disease. There is almost total destruction of the second toe, and considerable change has occurred in the third and fifth toes. On the fourth toe the destruction reaches down into the metatarsal bone. 3, Roentgenogram of right foot. There is an absence of a considerable portion of calcareous material. Most of the phalanges are atrophied and very much thinner than normal.

districts of Russia, Hungary, and the Balkan States, although it is known to occur in people of other nationalities. Many

methods of treatment have been advised, none of which have accomplished much in the way of cure. We have found out accidentally, rather than by being able to give a satisfactory explanation for its use, that a certain treatment or combination of treatments gives a hope of arresting this condition. It consists in bathing the affected part daily in hot and cold water alternately. This patient will be instructed to dip his feet in hot water for fifteen or twenty minutes, then into cold water for the same period. The water must neither be hot enough to scald or cold enough to produce a chill, but of a temperature that can be borne comfortably. This treatment improves the local circulation. At the same time he is given three times a week a duodenal infusion of a few quarts of Locke's solution.

Postscript.—This treatment given for two months has completely cured the patient.

TUBERCULOUS ARTHRITIS OF THE KNEE-JOINT: ANKYLOSIS IN A FAULTY POSITION; KNEE-JOINT RESECTION

Summary: Ankylosis of the knee to almost a right angle the result of a tuberculous arthritis. Correction of the deformity by a resection of the joint. Knee-joint tuberculosis unaccompanied by deformity of the limb better treated by the x-ray and hygienic measures than by resection. Danger of too much bone resection in children.

THIS boy, nine years of age, has been sick for the last three years. The trouble began with pain in the right knee, so that he walked with a limp. Gradually the knee swelled, preventing him from stepping on the right foot with his full weight. After a lapse of time the parents consulted a doctor, who advised an operation, to which they consented. The knee was opened below the knee-cap and pus and granulations removed, and evidently also a part of the capsule below the knee-cap. The leg was placed in a plaster cast. After a time the wound healed and the cast was removed. However, the knee gradually began to flex more and more, until at the present time it is almost to a right angle (Fig. 383, 1). He walks with a great deal of effort and pain, putting his whole weight on the left leg. We have to deal now with a knee-joint ankylosed in a faulty position.

There are several very interesting symptoms to be observed in this child. In the first place the upper part of his body is well developed. There is no disease of the lungs. His right hip is lower than the left, and consequently the pelvis is somewhat tilted toward the right side. This makes the left inguinal crease deeper and more prominent than the right, the shallow border of which is shown very clearly in Fig. 383, 1, 2. The left leg is considerably stouter and more muscular than the right, due to the hyperactivity of this side. The right leg, which is the afflicted one, shows a very thickened knee-joint and what appears to be a cold abscess just back of the knee-joint. Below the

knee is the scar of the former operation. The knee is ankylosed to not quite a right angle. However, the tilt of the pelvis makes it necessary that the child throw the upper body backward, forming a typical lordosis. Radiographic examination shows that the main trouble is in the patella, which is almost entirely destroyed.

Were it not for the faulty position of the knee-joint, the tuberculosis could be treated and healed with the aid of the



Fig. 383.—1, The knee is ankylosed at an angle of a little more than 45 degrees. The scar of the previous operation can be seen below the knee. The left leg is greatly hypertrophied. There is a secondary tilt of the pelvis with a lordosis. 2, Front view showing position of pelvis. The right hip is lower than the left and the right shoulder is higher than the left. Note the difference in the inguinal creases. 3, Shows the corrected position with the leg in a plaster-of-Paris cast.

x-ray without an open operation. However, it is necessary to correct the deformity before anything further can be done. We have, therefore, decided to make an ankylosis in a more favorable position. The most favorable position in this case is a straight one, with only a very slight flexion. It is not a good plan to overstretch the knee in a backward direction unless absolutely necessary on account of the extent of the disease. It

is only necessary to have a position so straight that the pelvis will not tilt, so that the patient may put weight upon the right leg and walk without difficulty.

To accomplish this purpose we will make a wedge-shaped excision of the knee-joint. We are making a transverse incision below the knee-joint, dissecting the skin upward so as to expose the whole front of the joint. We find that the patella is destroyed in its interior portion, but that the knee-joint itself is only affected on the surface by a typical granulomatous mass. A portion of the capsule was evidently removed at the former operation. There is very little change in the surface of the tibia and the cartilage is more or less normal. There are some adhesions of the joint surfaces. These adhesions are readily separated. The under part of the capsule above the patella is filled with tubercular pus and granulations, about a cupful of pus escaping after the patella is removed. We have scraped this surface quite free of granulations, cutting away every part of the capsule which seems to be diseased. We now cut out a wedge-shaped piece from the end of the femur and a similar piece from the tibia, so that when the leg is stretched the two bone surfaces will come together with little or no tension. We now unite the capsule in front with a few catgut sutures. A tube is inserted into the abscess cavity and the incision closed.

We shall keep this leg on a splint for about a week. At the end of that time the stitches will be removed and a plaster cast applied (Fig. 383, 3). He will then be given x -ray treatments to destroy whatever tuberculosis remains. We hope to get a union of the bones and a cure of the tuberculosis.

At present we are not doing very much surgical work on knee-joints affected with tuberculosis unless they are in such abnormal positions, as was the case with this patient. In most of the instances we cure the tuberculosis with the x -ray, leaving, as a rule, a functioning knee-joint or at least one fixed in a good position so that the patient can walk. In former times many of these knee-joints were operated upon. In most instances when the knee-joint was not much affected in its bony part the tuberculous portion of the capsule was resected, with the result

that the knee-joint was ankylosed in a straight position by a fibrous scar forming around the knee-joint and obliterating it.

In cases of tuberculosis within the bony portion of the joint it is always necessary to do a resection. As a rule a transverse resection produces very good apposition of the bones and good union, though at times the knee is bent backward—a genu recurvatum. Such a position is extremely disagreeable, inasmuch as it increases with time and is much harder to heal than the malposition presented in our patient this morning. In children we should resect the bones as little as possible because of danger of interfering with the epiphysis and subsequent growth of the bone.

CLINIC OF DR. CHARLES MORGAN McKENNA

ST. JOSEPH'S HOSPITAL

STONE IN THE URETER

Summary: Necessity of careful roentgenographic and cystoscopic examinations in patients giving a history of recurrent attacks of right-sided abdominal pain which are not consistent with being attacks of appendicitis. Technic of removal of stone by the open method in present case. After-treatment.

THIS case is interesting because the patient gives a history of recurrent attacks of pain for the past twelve years. She is forty-eight years old and has had these attacks of pain in the right lower quadrant of the abdomen as frequently as three or four times a year over this period of time. I was called to see her in an emergency, as it was believed she was suffering from an attack of acute appendicitis. In fact, she had been sent to the hospital once before and prepared for operation in the belief that she had appendicitis, but, peculiar as it may seem, the blood findings did not coincide with the amount of pain she was having, although the pain and distention of the abdomen were directly over McBurney's point. When I was called to see her in consultation she had the pain and distention in the same location, with a great deal of tympanites over the right side. The pain was well marked in this region and she also complained of much pain in the corresponding region of the back.

After a thorough examination she was sent to this hospital, where a blood examination was made. There was nothing in the report that would point to an infection. She gave no history of frequent urination, which is one of the very common symptoms of patients suffering with a foreign body or calculus in the ureter or kidney. There was no history of having passed blood in the urine at any time, and it was for that reason, I believe,



Fig. 384.—1, Introduction of right-angled grooved director into normal ureteral orifice. An incision is made over the grooved director through which the stone can be removed (2). In that way the forceps employed to grasp the stone can be inserted much farther into the ureter, preserving the normal sphincter of the ureteral orifice.

that the many physicians who have visited this patient never suspected stone. I cannot understand why a Roentgen ray examination was never made.

On coming to the hospital she was immediately prepared for roentgenographic examination, being first sent to the cystoscopic room, where a complete cystoscopy was done. It was no trouble at all to pass a No. 6 catheter into the right ureter for a distance of 3 inches from the ureteral orifice, but at this place the catheter met with an obstruction and would not go any farther. We then graduated our catheters downward, using the smallest size catheter, but still could not pass the obstruction, 6 cm. from the orifice. On passing the catheter we got a metallic click, which assured us we were dealing with a stone and not a stricture. This is an important point, as the treatment for calculus is so much different than for stricture. The catheter was introduced into the opposite side without any difficulty and the urine withdrawn and sent to the laboratory for routine examination. After spending some time trying to pass the catheter into the right ureter, where the suspected pathology existed, we injected a few drops of olive oil and sent the patient back to her room.

The patient was relieved of pain after the first day in the hospital and did not complain of it for some time, although she reported at intervals of seven to ten days, at which time we injected the various lubricants. At each examination the measurement seemed to remain that of 6 cm. and the x-ray plate which was made showed the stone to rest in the same position. On the last examination I was able to introduce a No. 4 catheter well above the stone, and I felt that we had solved the problem of removal of the stone without an operation. You remember that I have mentioned many times in this clinic that we use all the methods of trying to remove a stone in the ureter before cutting down on it. A celebrated surgeon once said that we never hear of physicians undergoing an operation for stone in the ureter, because they know that the large majority of stones passed without surgical interference. I believe that most stones will pass regardless of size. You remember this patient has had periodic colics for twelve years, and it is my judgment that the stone was well faceted and partly off the urinary tract. In this way the stone does not interfere with the routine work of the

kidney unless it is pushed a little bit out of its usual axis. When it does, it is manifested by severe pain and colic, as this patient has shown.

It is only the last few days that we have decided to operate on this case. She has had as many as five or six colics during the past three months. We have now made eight injections of oil, and in spite of the treatment the measurements and roentgenographic examination show the position of the stone unchanged. She is willing, in fact has even asked, to have the stone removed surgically, and it is this operation that we are going to do this morning.

You notice that the patient is prepared in the same manner as are all patients for suprapubic cystotomy or any bladder operation through the suprapubic space. This morning I am going to use local anesthesia. We will use $\frac{1}{2}$ per cent. novocain by the nerve-blocking method. This will work very well down to the bladder and even through the bladder, but the question in mind is whether or not we can remove the stone in the ureter with this same anesthetic, but it is in my opinion well worth trying.

The bladder has been well distended with water, which brings it up into the perivesical space, and keeps the peritoneum from coming in the line of our incision, and makes the bladder very much more accessible. The first part of the incision is made rather small and well down toward the symphysis. I think it is always well to make the incision in the skin large enough so we will have no difficulty in exposing the bladder wall. You notice that the fat on this bladder is very thick and conceals the bladder. The patient complains of no pain as we push the fat off the bladder wall. We do this so as to expose the margin of the bladder and to have a clean line for suture afterward. It also does away with the danger of fat necrosis, because this is a good media for infection. The bladder is now open. The catheter which was inserted into the bladder at the beginning of the operation is still in place. We use a very large catheter in the ureter and clamp it off. As soon as the opening is made in the bladder we release the catheter so as to keep the water

which has been in the bladder from running over the abdomen and the sterile linen. I make a point of this for the reason that it does away with a messy operation. Thus far, you see, we have only used two ligatures, and you might say that so far it is a bloodless operation. In another operation using the same incision we might have as many as eight or ten bleeding points.

With the retractors well in front it is easy to locate the ureter. I am going to try to locate the stone with this right-angled forceps. You notice that the long axis of this forceps is about $3\frac{1}{2}$ inches in length. This forceps has been made especially for introduction into the ureter. I am going to try and bring the stone down through the ureteral opening. You will remember I said that in our various measurements we never got the stone down below 6 cm. from the ureterovesical opening. Hence, we know just how far up we have to go. We have trouble in introducing the forceps. I push the forceps up just as far as I can and by dilating the ureteral orifice I can just feel the stone. I am now trying to grasp the stone between the jaws of the forceps, but they seem to slip over the top of the stone, which indicates to me pretty well that the stone is not faceted and is located a little posterior to the normal channels of the ureter. I will not spend much time trying to bring the stone down in this way, but will introduce into the ureter a right-angled grooved director and split the mucous membrane of the bladder over the ureter and about 3 cm. above the ureterovesical orifice. In this way I will be able to introduce the same forceps into the ureter and use it at a better angle than I could when introducing it through the normal channel as I did first. You have all seen surgeons slit the orifice with a scissors, thereby making a larger opening and giving more room. I think it is well always to have the normal ureteral sphincter intact as long as the same opening can be made through the mucous membrane above. It is a very simple matter to put in a suture, if necessary, in closing the wound. We now have no trouble in placing the jaws of the forceps on either side of the stone. The only point I want to emphasize is the removal of the stone without crushing it. We must be very careful in lifting the stone out and bringing it

down, because if even one little portion of the stone is left in the ureter it will serve as a nucleus for the formation of new stones. Here is the stone, and I believe we have it intact. I will examine it before passing it around. You will notice the peculiar shape of this stone—it is rather triangular and has a fairly well-defined margin. This stone, in all probability, has been present here for years, and because of its peculiar shape there was no possibility of its coming down any farther.

Thus far we have consumed but very little time in this operation. We will discontinue the gas anesthesia, which was administered during the removal of the stone, as the closure can be made without the use of a general anesthetic. I think this is a very good method of doing any kind of bladder work, especially the removal of foreign bodies, or even prostatic work. The same local anesthesia that was used for the first part of the operation is still in effect, and the sutures can be put in without the patient experiencing any pain. I am using a very fine chromicized catgut suture for the bladder. This may or may not be put in according to the size of your incision. In this case owing to the size of the stone it was necessary to make a fairly long incision—it was at least 1 cm. in length. I do not believe it will do the patient any harm to put in this one stitch to obliterate a fistula from the ureter into the bladder. The bladder will be closed as usual by placing a small tube at the upper angle of the bladder. I have frequently closed this class of case up tight without putting in any drainage. Kolischer has advised this method many times, but where the danger of infection is as great as in this case, I am afraid to take the risk. Hence, I will put in this small tube, which is about $\frac{1}{8}$ inch in diameter. You notice how very careful we are to suture the bladder wall up tight to the tube. We suture the fascia muscle and skin in the same manner up the tube. This suture is called a "water-tight" suture. The urine will be drawn off without giving the patient any discomfort whatever. At the end of seven days the tube will be removed, at which time it will be seen that the skin has suffered no injury or excoriation from overflowing urine. I have said that in prostatic cases the discomfort is obliterated by very

careful suture at the time of operation. When the tube is removed we will have primary healing up to the small opening, providing no infection occurs. The small opening will then close in a very few days. I do not believe this patient will have any untoward symptoms and will probably be able to leave the hospital in ten or twelve days.

Some one has asked me regarding the after-treatment in as far as the ureter is concerned. We make it a routine in this clinic always to irrigate the ureter on that side with an irrigating solution, such as sterile water or boric acid solution, to see that there are no fine particles of the stone left in the ureter. I think that is always a very good plan where a stone is removed from the ureter^{or} bladder, because even after removal there is always a chance of fine^{or} particles being left. Thus far we have never had any untoward results. However, I have had re-formations of stone after doing prostatectomy where the irrigations were not employed. I think it was always due to blood being allowed to accumulate, forming a nucleus for salty deposits. This patient will be sent back to bed and will be treated as any other bladder case.

TUMOR OF POSTERIOR URETHRA: REMOVAL BY FULGURATION

Summary: Tumor in posterior urethra in a patient treated for several years for posterior urethritis. Value of urethroscopy in cases of persistent urethral discharge. Removal of tumor by fulguration.

THIS patient, Mr. K., aged twenty-seven, gives a history of gonorrhea five years ago. He says that he was completely cured after the first attack, but that he has had a periodic discharge. The urine has never been free from shreds during the past five years. He has received a great deal of treatment for the so-called posterior urethritis. He occasionally goes as long as three days without noticing any morning drop. The discharge sometimes appears during the day, especially when he goes a long time without urinating.

Every patient suffering with a chronic discharge should be urethroscoped to ascertain whether or not a tumor or a calculus is producing the discharge.

On cystoscopic examination we find the bladder perfectly normal in every respect. On urethroscopic examination we find a large cyst on the left side, a little in front of the verumontanum. The tumor either comes from the sulcus or is connected with one of the openings of the prostatic gland. Through the urethroscope it looks like a retention cyst. We will remove the tumor by fulguration.

With a Guyon forceps we will inject 2 drams of 1 per cent. novocain into the posterior urethra. As the water flows through the urethroscope for the distention of the posterior urethra the tumor can be seen to fall backward toward the bladder. As soon as the flow is stopped the tumor immediately comes forward. We will now introduce the fulgurating point and cut off the tumor at its base. The pedicle is about $\frac{1}{8}$ inch in length and very thin. The body of the cyst is about the size of a small pea. I have now removed the entire tumor, which will be passed

out with the urinary stream. Sometimes we get these tumors out *in toto*, but at other times they are broken in pieces. In case the tumor is not passed in the urine, it will be removed with a Bigelow syringe. You can scarcely tell where the operation



Fig. 385.—A, Vertical section showing cyst in sulcus of posterior urethra. The cyst was removed by fulguration. B, Appearance of tumor through urethroscope.

was made. The patient will be instructed to report at the office within three days, at which time the urethra will be examined with the urethroscope.

Some one has asked regarding the prognosis in this particular case. From previous experience I should say that the

man will have normal urine, free from shreds, in three weeks. As a rule a chronic discharge with shreds in the urine resulting from foreign bodies, such as cysts, polypi, clears up immediately after fulguration. I would advise that these cases be urethroscoped before treatment of any kind is instituted. The poor results obtained from local treatment in so many cases of so-called posterior urethritis are due to the fact that the underlying cause of the discharge is not ascertained by urethroscopy.

In the after-treatment of these fulgurated cases we give 30 or 40 grains of urotropin daily for the first few days. Up to date I have seen no untoward results. These patients do not get an epididymitis, because if there is any infection present it is immediately cared for at the time of operation. Irrigations with 1 : 5000 silver nitrate should be given every second day for a period of ten days. It is my opinion that every patient suffering with a chronic discharge lasting over a period of three months or more, regardless of whether he gives a history of gonorrhea or not, should be immediately urethroscoped. It has been my experience that patients giving a history similar to that of the patient on whom we have just operated go from one doctor to another receiving the routine treatment for posterior urethritis, when the real trouble is some form of tumor in the posterior urethra. I therefore cannot emphasize too strongly the necessity for a thorough examination of every patient.

CLINIC OF DR. ALBERT H. MONTGOMERY

PRESBYTERIAN HOSPITAL

BONE CYSTS

Summary: Osteitis fibrosa cystica a comparatively rare lesion. Presentation of two patients with pathologic fracture the result of this disease. Discussion of its etiology, pathology, diagnosis, prognosis, and treatment

WE have to show you today 2 cases of a rather unusual bone disease. Our first patient is this little girl, six years old, who came under my care at the Children's Memorial Hospital on April 8, 1920. She has the following history:

Yesterday while playing at school the child fell, striking on her right arm and shoulder. From the detailed questioning it would appear that the fall was very slight and hardly sufficient to fracture a normal humerus. Immediately after the injury the child could not move her arm. Last night it pained so severely that she could not sleep. This morning the patient was brought to the hospital by the school nurse.

Physical examination: She is a well-developed, well-nourished, little white child. When I remove this sling from the right arm she persists in supporting the arm with her left hand. The right elbow is held out away from the body. The right shoulder is evidently swollen, but there is no discoloration. As I palpate carefully along the humerus, it is noticeable that she is very tender over this spot, about 2 inches below the acromion. Here in the axilla I can feel the head of the humerus, apparently in the glenoid cavity. If I grasp the arm at the elbow and rotate it gently I can feel a dull sense of crepitation. Measuring now with a tape, from the acromion to the outer condyle of the humerus, the right arm shows 17 cm. in length and the left 18 cm. Carefully placing the child's right hand on her left shoulder,

I can easily press the right elbow against the chest, so Dugga's sign for dislocation of the shoulder is absent. We have made a detailed examination of the rest of the body and have found no abnormalities. Analyses of the blood and urine are negative. The Wassermann test has not been made. Most likely we are dealing with a fracture of the humerus, but the possibility of an epiphyseal separation must always be considered in treating these cases in children.

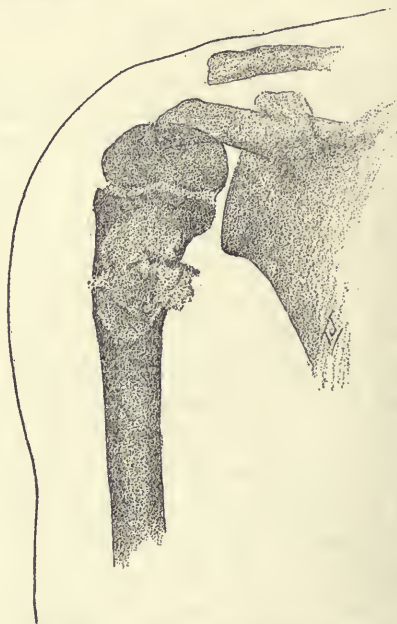


Fig. 386.—Bone cyst of the humerus with a pathologic fracture (Case I).

Let us now examine the roentgenograms. In the upper part of this humerus (Fig. 386) we can see a clear egg-shaped area, with a sharply defined border. The regular edge of this cavity is broken by a fracture that extends across it. Bone fragments lie irregularly in the cavity. Where the cortex forms the wall of the cavity you will notice that it has been reduced to linear thickness. Please observe, also, that the upper border of the cavity lies below the epiphyseal line. The bone surrounding this cavity, the periosteum, and the soft parts show absolutely no

changes of any kind. We have taken roentgenograms of all the other bones of the body, but have found nothing abnormal.

From the history and the roentgenographic findings I think we can safely make a diagnosis of localized osteitis fibrosa cystica, complicated by a pathologic fracture. The absence of any changes in the structure of the bone around the cavity rules out an osteomyelitic process of any kind. The oval shape of the cavity instead of a globular outline, the definite confinement



Fig. 387.—Five weeks after injury. Fracture healed. Beginning obliteration of the cyst cavity by bone formation (Case I).



Fig. 388.—Nine weeks after injury. Further filling in of the cyst cavity by bone formation (Case I).

of the lesion within the bone, the tendency to extend down the shaft without involving the epiphysis, and the absence of pain up to the time of fracture speak strongly against a sarcoma.

It is well known that fractures occurring in these cases of osteitis fibrosa cystica heal kindly. In many instances the cyst is cured by obliteration through callous formation. For that reason we will treat this case as a simple fracture. The fragments are in good position, so we will place a pad in the axilla and im-

mobilize the flexed arm by a posterior molded splint, extending from above the shoulder to the wrist.

The splint was removed five weeks later. Bony callus was palpable at the site of the fracture. A roentgenogram taken at this time (Fig. 387) showed definite callous formation and a bony filling in of the cyst cavity. Ten days later movement of the arm was normal and painless.

It is now nine weeks since the injury. The roentgenogram taken this morning shows the cyst cavity almost entirely filled by bone formation (Fig. 388).

Our second patient, whom I assisted Dr. Dean Lewis in treating, is this woman, twenty-nine years of age. She was engaged in housework up to the time of her entrance into the hospital. Her trouble dates back to February, 1915, when she fell down a flight of icy stairs. The following morning she could walk, although quite lame, and there was evidence of swelling. She noticed, while lying in bed, that she could not flex the thigh because of muscular weakness at the hip. She worked for ten days after the accident, but by that time the pain and limping had become so bad that she went to bed for three weeks. When she again tried to walk the pain was not so severe, but she still limped and could not walk upstairs. She then went to a hospital near Boston where a roentgenogram of the hip was made. The physicians told her that it showed no signs of fracture or tuberculosis. They kept her in bed for a month, then applied a cast, and sent her home. Four weeks later the cast was removed and after about a month her pain had completely disappeared and her walking was normal except for a slight limp. She had a little discomfort when she first got up after sitting awhile, but it would disappear on walking. For a year and a half she was fairly comfortable, but in June, 1917 she began to have pain when she walked. The old inability to flex the thigh returned also. After three weeks' rest her condition seemed to improve and she tried to walk again. The pain started immediately and bothered her almost every day, but she continued to work up to a month before admission, when it became so severe that she had to go to bed. She went to a hospital for ten

days and had another roentgenogram taken, but nothing further was done. Two weeks later while walking down stairs something seemed to snap about the hip and she felt severe pain in the leg. After that she was unable to move the leg. The next day there was considerable swelling about the hip. She was brought to the Presbyterian Hospital October 23, 1917.

When this woman entered the hospital a detailed physical examination was negative except for the region of the right hip.



Fig. 389.—Extensive bone cyst of the upper end of the femur with a pathologic fracture of the neck (Case II).

The outer side of the thigh, at the level of the great trochanter, was moderately swollen. Definite tenderness on deep pressure was present on the front and side of the thigh, over the base of the neck of the femur. There was some shortening of the right leg. Movement of the leg in any direction was severely painful. Examinations of the blood and urine were negative.

A roentgenogram made on October 23, 1917 (Fig. 389) shows a

very interesting picture. You will observe a definite area of rarefaction in the upper end of the femur involving most of the neck and extending down the shaft. This area is somewhat egg shaped in outline and crossed by numerous bony trabeculae. The cortex is markedly thinned in some places, but the periosteum shows no thickening. No evidence of any change in structure is apparent in the bone surrounding the rarefied area. The outline of the femur is normal and unbroken except at the neck, where a line of fracture is present, extending from above downward and inward across the upper part of the diseased bone. Roentgenographic examination of the other bones of the body was negative.

From the history and the roentgenographic findings a diagnosis was made of osteitis fibrosa cystica, with pathologic fracture. The absence of any changes in the bone surrounding the cavity ruled out pyogenic osteomyelitis, lues, and tuberculosis. Sarcoma, especially the giant-celled type, could not be ruled out absolutely, but the long duration of the trouble, two and a half years, spoke strongly against malignancy. Operation was advised and accepted.

Operation.—October 25, 1917, under ether anesthesia, a longitudinal incision was made in the outer side of the thigh over the great trochanter. The bone was exposed and the periosteum elevated. An opening was made into the cyst cavity with chisel and bone-biting forceps. The wall of the cavity was smooth and quite thin, not more than $\frac{1}{8}$ inch thick in places. The cavity contained a dark brown watery fluid resembling old blood. The curet failed to demonstrate any lining membrane. The cavity was swabbed out with phenol followed by alcohol and then dried carefully with a cautery. The pieces of bone removed in opening the cyst were then placed in the cavity and it was filled with iodoform and glycerin emulsion. It held about 40 c.c. of the emulsion. Muscles and fascia were closed with catgut, and the skin with a continuous beeswax silk suture. A body cast was applied, extending from the costal margin and including the entire right leg.

The wound remained clean. Fixation was maintained until

March 1, 1918, when the cast was removed. The roentgenogram at this time (Fig. 390) shows definite bone formation replacing the cyst cavity. Most of the iodoform emulsion has been absorbed. There is some bony union at the site of fracture. The patient was allowed to move the leg in bed and after a month walking was attempted. A few days later the patient sustained a slight fall, but, fortunately, no damage was done. Another



Fig. 390.—Four months after injury. Bone formation filling the cyst cavity. Small amount of the iodoform emulsion unabsorbed, fracture healed (Case II).

roentgenogram (Fig. 391), taken April 8, 1918, shows a further filling in of the cavity with bone formation. The fracture has united with bony union. On the inner side of the bone the cortex has thickened. Only a small amount of the iodoform emulsion is left. May 10, 1918 the patient could walk comfortably with assistance and was discharged from the hospital.

Today, as we observe this patient, two and a half years after her pathologic fracture, you will notice that she walks freely,

but with a slight limp. Here on the outer side of the thigh is the old operation scar, but there is no deformity. The limp is due to some shortening of the leg as a result of the fracture of the neck of the femur.

Our knowledge of bone cysts dates back to Virchow, who in 1876 discovered a cyst of the humerus at postmortem, and on account of the number of cartilage cells in the tissue he ascribed the cyst formation to the liquefaction of a chondroma. Ten



Fig. 391.—Five months after injury. Bone cyst cavity almost obliterated by bone formation (Case II).

years later Rindfleisch found bone cysts in osteomalacia. In 1891 Von Recklinghausen described cyst formation as a generalized process occurring in long bones. From his observations on the pathology he designated the lesion as generalized osteitis fibrosa cystica. Bloodgood, Silver, and Elmslie have successively reviewed the cases reported, and their studies have added greatly to our knowledge of this disease.

Considerable confusion exists in regard to the classification of

cysts occurring in bones. Because they are found in a number of pathologic conditions their etiology has been ascribed to various productive factors. Under the headings used by Silver and Landon all the various types of bone cysts may be classified etiologically as follows:

(a) Infections and toxins:

1. Tuberculosis.
2. Syphilis.
3. Pyogenic.
4. Echinococcus and cysticercus.
5. Mercurial poisoning.

(b) Metaplasia:

1. Paget's disease (osteitis fibrosa).
2. Osteomalacia.
3. Von Recklinghausen's disease (generalized osteitis fibrosa cystica).
4. Localized osteitis fibrosa cystica.

(c) Neoplasms:

1. Cysts resulting from degeneration of enchondromata.
2. Cysts occurring in callous formation, subperiosteal hematoma, etc.
3. Cysts associated with central giant-cell sarcoma.
4. Dentigerous.

The type of bone cysts that we are discussing is the one defined by Silver as being "restricted to the cavities in bones which contain fluid and have no definite connections with disease of the surrounding tissues." Osteitis fibrosa cystica may be generalized as described by von Recklinghausen where many bones are involved, or localized where only a single bone is affected.

As to the etiology, in the localized form, with which our patients were affected, the causative process is still in dispute. Virchow's theory of the liquefaction of chondromata has been generally discarded, as cartilage cells are found only in small numbers and may be regarded as part of a metaplasia. Rehn, from his experiments on pigs, concluded that this cyst formation was only a phase of dystrophy in growing bones, similar to snuffles

disease in hogs. Organisms have been cultured from the cyst fluid in a few cases (Murphy, Rapke and Lubarsch, Meyerding), but in most instances the fluid has been sterile. Silver and Landon regard the condition as a metaplastic process. Bloodgood, from careful and extensive studies of a large number of cases, states that the condition is an inflammatory change probably resulting in most instances from trauma. In whatever pathologic way the cyst forms, most writers agree that trauma is the initial cause in almost all cases. Our second patient has a distinct history of injury, and traumata are so frequent in childhood that the provocative injury may often pass unnoticed. The disease affects bone during the growing period. Most of the cases reported appeared in young individuals. In one series 70 per cent. appeared in patients under twenty years of age and 85 per cent. in patients under thirty years. The youngest case on record occurred in a child two and a half years old.

The process appears almost entirely in one of the long bones, usually at the proximal end, but bone cysts have been found in almost every bone in the body. Silver in 97 cases found the femur, humerus, and tibia involved in 73 per cent. in the relative order named. The cyst may be unilocular or multilocular and may be multiple. Although it forms near the end of a bone, the epiphysis is never affected, expansion occurring in a direction away from the end. The cyst produces marked thinning of the cortex so that fracture commonly results, but the periosteum shows no thickening or other changes. In many cases the cyst wall has no lining, but in older cysts which have been cured previously a lining of thickened granulation tissue has been found. The cyst fluid is reddish brown and watery, occasionally containing a few small blood-clots. Bloodgood, from his microscopic studies of the cyst wall, describes an inflammatory layer invading the bone and producing the cyst by gradual bone destruction.

This disease has no characteristic symptomatology. In a large number of cases a pathologic fracture is the first sign of trouble, as in the case of the little girl I have just presented to you. In other instances indefinite pains of a rheumatic char-

acter, such as our second patient complained of, may be noticed. They are probably due to pressure on the surrounding structures and may cause limping. Atrophy of the muscles from disuse, and deformity of the limb from the growing cyst, may be present.

The history of a traumatic injury in a child or young adult, followed by pathologic fracture of a long bone, should make one suspicious of the presence of a bone cyst. The x-ray has been of great value in these cases since Heineke reported its use in 1903. The presence of an egg-shaped cavity, well defined and often trabeculated, in the proximal end of a long bone not invading the epiphysis, and showing no evidences of reaction in the surrounding bone, is almost diagnostic of localized fibrous osteitis cystica. In all cases the entire skeleton should be examined roentgenographically, to rule out the general form of this disease. Finally, however, it must be emphasized that the absolute diagnosis can only be made by an exploratory operation and a pathologic examination.

Differentially we must consider: (1) Sarcoma. If malignant, this tumor is usually very painful and grows rapidly. The surrounding tissues are quickly invaded. The rather benign central giant-cell sarcoma grows slowly and seldom breaks through the bone, but tends to grow toward the epiphysis and to invade it. In the roentgenogram sarcoma has a globular shape instead of the oval form of the bone cyst. Exploratory operation is often necessary to settle the diagnosis. (2) Syphilis. Here the bone and especially the periosteum will show the bone growth reaction so characteristic of lues. The Wassermann test will also be important. (3) Osteomyelitis. In osteitis aluminosa we may have a cyst containing sterile fluid. However, a sequestrum may be seen in the roentgenogram and the surrounding bone will show evidences of inflammatory reaction. (4) Metastatic carcinoma. Occasionally in adults bone metastases may have to be ruled out. The history of the case will show a primary growth of the breast, prostate, adrenal, or thyroid. The roentgenogram will reveal the moth-eaten appearance characteristic of carcinoma in bones.

The outlook is favorable in practically all cases of localized

osteitis cystica. Fractures tend to heal rapidly under ordinary treatment and the cyst may disappear in the healing process. Other cases respond well to conservative surgical measures.

Open operation is the treatment of choice. The cyst cavity is opened, the fluid removed, and the cavity cureted. The cyst wall is then crushed in as thoroughly as possible without completely fracturing the bone. A cast is applied to protect the bone until it has regained its strength. In some cases the bone cavity has been filled with iodoform and glycerin or the Moorhof bone plug, instead of crushing the wall. The results were satisfactory. Resection of the affected portion of the bone, followed by bone-grafting, has been used in other instances. It has been abandoned, however, for the more conservative procedures of cureting and crushing.

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THE AMPUTATION OF FINGERS AMONG ANCIENT AND MODERN PRIMITIVE PEOPLES AND OTHER VOLUNTARY MUTILATIONS INDICATING SOME KNOWLEDGE OF SURGERY

Summary: Surgical procedures evolved first as a form of religious practice or in connection with the appeasing of an angry god or exorcising a demon. Shamanism a cult or form of religious belief closely linked with the development of primitive surgery. Term "medicine-man" misleading, since shaman is of wider significance and more accurate; a shaman being priest as well as healer. Distribution of the practice of finger amputation and its significance. Surgical procedures. Scarring and tattooing, their significance and lack of pathology. A primitive method of hysterectomy. Incising the urethra. Prevalence and antiquity of circumcision among primitive races. Perforation of nasal septum. Sepsis probably prevented by a coating of grease and paint customarily smeared over the body.

THE primitive mind worked in a curious manner. If an ancient man performed a procedure which we today call surgery he was not aware of doing anything unusual or unique. When the shaman, medicine man, or priest amputated a finger, trephined a head, cauterized a scalp, or sucked the pus from a wound he had no intention of counteracting some antagonistic phase of nature, but to exorcise a demon, to let out the evil spirits, or to in some manner appease an angry god. Gods dwelt in every object of nature and the simple mind of man saw only the steps necessary to appease them. Surgery thus had its beginnings, and to these simple beginnings we have applied the name of surgery, because we have adapted them to other ends. Science of all kinds was nebulous in its origin.

Shamanism, from which early surgical procedures were evolved, is well known in many parts of the world as a phase in

religious evolution. All races of men at an early stage of their development display this form of concept in some manner. Although the term was first applied only to the practices observed



Fig. 392.—Silhouettes of hands in red and black, as depicted on the walls of the cave at Gargas, Spain, of the Aurignacian age (late Paleolithic, possibly 20,000 years old). These impressions of amputated hands and fingers were selected out of a series of over 200 and indicate a truly shocking prevalence of finger amputations among these primitive peoples. Numerous attempts have been made to show that these imprints do not represent amputations, but without success. The custom has doubtless been prevalent since early in the Paleolithic and has endured today. It is the representation of the very oldest surgical procedure; older even than trephining. (After Sollas.)

among some tribes of northern Asia, it has lately been more generally used to express the placation and control by magic and fetichistic rites of spiritis or demons who are supposed by

primitive man to rule all mankind and, indeed, the whole realm of nature. The shaman was thus not only a practitioner of sorcery, able to drive off the spirits which bring death, sickness and misfortune, and to invoke others which confer success and love, but he was a priest, who by communion with the higher powers learns and afterward teaches to others the form of practice used in the cult. The term "medicine-man" is an awkward compound, invented by the early explorers of North America, which is entirely misleading, since it conveys some conception of therapeutics. If they had a pharmacal knowledge or any

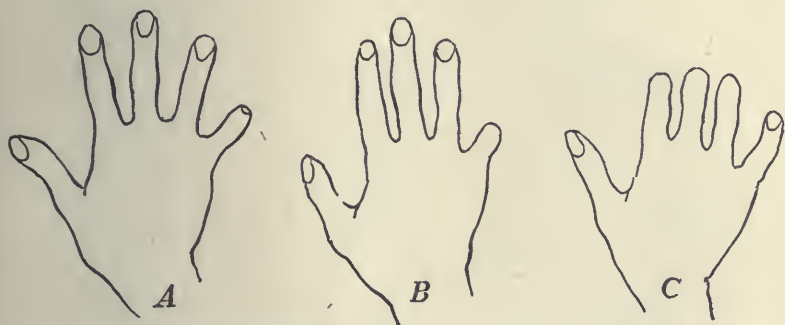


Fig. 393.—Virchow's figures of mutilated hands of a Bushman seen from the back. *A*, Last joint of little finger amputated, but retains a vestige of a nail. *B*, Similar to *A*, but with no trace of a nail. *C*, The last joint of the first and second finger and the tip of the third have been removed. *A* and *B*, Male; *C*, female.

idea of healing it was a secondary matter to that of appeasing the spirit.

The practices evolved by a race in its more primitive state were abandoned after they had progressed to a better understanding. Thus trephining was not used as a relief for headaches or to let out the demon after the rise of the conception that the god could be as well appeased by some allegoric object, such as a gourd with an opening, which was presented as a trephined head to the god, who would accept it in lieu of the actual operation. Surgery among the primitive races of man is thus a very obscure thing. That primitive men had any definite conception of what constituted surgery is absurd. The processes per-

formed by them we call surgery now, and they do indicate some knowledge of ligation, stoppages of hemorrhage, sepsis, and the



Fig. 394.—A young woman of the Anula Tribe, Central Australia, showing cicatrization of the skin. (After Sollas.)



Fig. 395.—Stone knife used by the War-ramunga Tribe, Central Australia, similar in form to the flint knives used by ancient man. The handle is of wood, decorated with pigment, attached by resin. Such implements may have formed a portion of the primitive surgeon's kit.

like. They had, too, some meager knowledge of anatomy. When an Australian native slashed his arms or body crosswise with a flint knife to make the beautifying scars necessary to his idea of cosmetics he was always careful to avoid cutting any of

the larger arteries. It is, therefore, the intention of this series of essays to point out the procedures among ancient man which indicate any knowledge of anatomy, surgery, or treatment, on the basis of which a logical evolution of modern surgery may be based.

How or why primitive man came to the conclusion that the amputation of a finger or fingers would appease a god or add to their personal beauty is unknown. We do know, however, that the later Paleolithic races (the Aurignacian) of France and Spain, who inhabited that country some seven thousand years ago, had practised the sacrifice, since they have left silhouettes of hands with amputated finger stumps on the walls of many caves. These silhouettes were made, doubtless, by placing the hand on the wall of the cave and blowing thereon a mouthful of pigment, red ochre, or other mineral pigment with which they used to adorn their residences. The impulse to do this is doubtless the same which induces the average school child to outline his hand in pencil or chalk. At any rate, these silhouettes, protected from the weather in the caves, show us that it is an old custom and we know it persists to the present day.

Such imprints have been found on the walls of caves in California, Arizona, Peru, Africa, and Australia in recent times, and a similar imprint, known as the "red hand," has also been observed in Egypt, Palestine, Arabia, Babylonia, India, Phœnicia, and Mexico. The custom is thus well authenticated. The purpose of the amputation was as various as the countries in which it was employed. It was a symbol of mourning in the Nicobar Islands. It was a sacrifice in India, demanded at the death of a ruler. It was a part of the initiation ceremony among certain Indians of North America; to appease a god; as a distinguishing mark of caste; as a preparation for marriage, and for other obscure reasons.

The operation was often confined to the little finger, and was performed by a flint knife, the incision being made at the joint and the first amputation involving only the terminal phalange. Hemorrhage was stopped by a bandage, by applying fats, and by heat, such as a heated stone. Rare cases have been observed

in which an individual, usually a woman, had sacrificed the last two joints of all fingers of both hands. Imprints on the Aurignacian caves of the Paleolithic of France indicate a similar extent of the practice. The surgical aspect of the amputation is obscured in its symbolism, but that it was a surgical procedure is obvious. Ligation was often employed in severing a finger-joint. A thread of sinew being bound about the joint was daily constricted until the joint fell off. An Indian youth was observed to place his finger on the sacred buffalo skull and chop it off with a stone hatchet. Such a sacrificial custom indicates some slight surgical knowledge, though of a crude variety.

The primitive races of Australia and some of the races of Africa at the time of puberty, or later, have a custom of scarifying the body with long, though not deep cuts of a flint knife, involving the skin and superficial fascia. The resulting scar tissue was thought to be very beautiful. Scarification of the tissues for therapeutic purposes has not been seen. Some knowledge of anatomy was expressed by the care that was taken to avoid the larger blood-vessels, and few cases of death from hemorrhage have been recorded. The incisions, made a few at a time, bled profusely, and no apparent attempt was made to control the flow of blood. The individual was often greatly weakened. To secure a beautiful adornment of the entire body often consumed several weeks or months. It is remarkable that there are so few cases of sepsis involved either in tattooing or scarification, and the absence of keloids, to which negroes are especially prone, is an interesting commentary to the oft-recorded observation of the immense resistance possessed by primitive races of man and wild animals. We are thus more readily able to understand the almost total absence of pathology among ancient and primitive races of uncivilized man. We pay for our civilization in terms of pathology and lowered resistance.

An interesting, though distressingly brutal, hysterectomy through the vagina, colpohysterectomy, is said to be performed as a religious ceremony among certain uncivilized tribes of southern Africa. It indicates some knowledge of anatomy, though its purpose was disgusting. In order to have a sterile mate for

a malformed male individual known as the *mika* man, whose penis, through excessive bruising, was greatly hypertrophied, the uterus and ovaries were removed from a young woman selected for her beauty for this purpose. After the hysterectomy the posterior wall of the vagina was slit with a flint knife as far as the rectum.

The method of procedure is described as follows: A bundle of stiff feathers or stiff plant fiber is introduced and retained in the vagina firmly embedded against the cervix. After some days or weeks the uterus and posterior vagina adhere to the mass of feathers or fiber by reason of the excessive irritation. When the proper amount of adhesion is supposed to have taken place the shaman, usually an elderly man, who introduced the mass into the vagina, with proper ceremonies, forcibly pulls out the mass of feathers or fiber, using no anesthetic, thus exposing the uterus and ovaries, as well as the everted vagina. The parts are then rudely severed, with proper incantations, with the flint knife and cast aside in abhorrence. The profuse bleeding is stopped in the usual primitive method, cobwebs, application of hot stones or fats, and the posterior vaginal wall incised. That death often accompanies this operation is probable, though there is little data on this point. Primitive people are extremely averse to allowing white men to witness their religious rites, and they are usually performed in some remote fastness of the wilderness where interruption is not expected. Thus among the many native operations of trephining which have been done in recent years among the highland natives of Peru only one has been witnessed by a white man. Our knowledge of these procedures is thus all the more meager.

Another crude procedure, intensely sexual in its nature, known as subincision, is said to be performed by the same races, as well as in Australia. In order to permit sexual indulgence without the intervention of pregnancy the male urethra is severed at the base of the penis. Doubtless the anterior urethra becomes obliterated. This operation indicates some crude conception of fertilization and of the anatomy of the urethra and its function.

The antiquity of the practice of circumcision has been dis-

cussed in a previous contribution,¹ but it will be convenient to mention here its occurrence in Australia where it commonly forms part of an initiation ceremony. There is some reason to suppose that the practice originated as one of the religious rites of making a boy into a man in connection with the rites of puberty, about which many primitive races have very elaborate ceremonies into which only the initiated can enter. The custom is very widely distributed and its close association with totemism is well established. Circumcision for both male and female is known among certain tribes of Africa; it is found in Madagascar, many of the Pacific Islands, as well as among the Aztecs in America, the Caribs of Orinoco, and the Tacunas of the Amazon. Its origin is probably to be sought among the Paleolithic races, but of that origin we have at present no data, the oldest known representation of the rite being that engraved on the wall of a tomb of the Fourth Dynasty (3000 B. C.) in Egypt. It is frequently associated with subincision.

The knowledge of surgery involved in the act of primitive circumcision was very meager. There was probably never a therapeutic measure in view. Among females the labia minora were excised, often very roughly, bleeding being left largely to care for itself, the result often being a slight deformity.

A singular mutilation, though of slight surgical interest, is the perforation of the nasal septum by certain Australian tribes for the insertion of the "nose-pin," a wooden stick 5 or 6 inches in length, as thick as a man's finger, which reached right across the face. Absence of sepsis in this mutilation, as in tattooing and making of cicatrices, may be partly due to the custom of anointing the body liberally with a mixture of grease and red ochre. This protected the body against vermin, so why not as well a protection against bacteria. Fleas, flies, and other insect pests, so active today in the distribution of disease, are said not to have been known by the aborigines until they were introduced by the white men.

¹ Primitive Surgery in Ancient Egypt, Surgical Clinics of Chicago, April, 1920.

CLINIC OF DR. HARRY CULVER

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PAPILLOMA OF THE POSTERIOR URETHRA

Summary: Symptoms of prostatic hypertrophy unrelieved by prostatectomy. Further cystoscopic examination reveals multiple papillary tumors of the posterior urethra. Removal by snare and fulguration. Epithelial tumors of posterior urethra comparatively rare.

THIS patient is a man fifty-six years of age, a motorman by occupation, who enters the hospital complaining of inability to urinate.

There is a history of gonorrheal infection thirty-six years ago and a short period of urethral discharge six years ago. The latter infection was classified as non-gonorrheal. There have been no further signs or symptoms referable to the genito-urinary tract until the onset of the present trouble.

In January, 1920 the patient first became aware of nocturia, which was but once a night at first, but rapidly increased in frequency until he found it imperative to void at least once an hour during the night. There was but very slight increase in the frequency during the day. The frequency was not associated with pain or other urinary symptoms. Early in February a physician was consulted, who prescribed internal medication, nature of which not known. Patient now noticed a gradual decrease in the size and force of the urinary stream. One evening after an especially long day's work he was unable to start his urine. He was relieved by catheter on this occasion, and once a day thereafter for about a month, when he was cystoscoped, the result of which was a diagnosis of hypertrophied prostate.

He was operated on suprapubically April 3d by a competent surgeon, who found only a slight middle-lobe enlargement, which was removed.

The urine drained entirely from the suprapubic opening until May 16th, when this opening temporarily closed and the patient again experienced acute urinary retention. He was then brought to the Cook County Hospital on the service of Dr. Vernon C. David.

Upon admission it was impossible to pass any sort of ureteral instrument, so the retention was relieved by probing the suprapubic wound, and 30 ounces of very turbid urine were obtained. Urine drained freely suprapubically for five days. Under ether

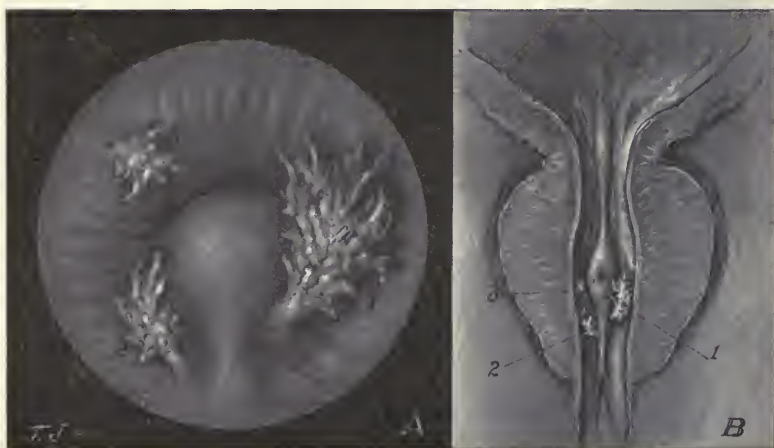


Fig. 396.—*A*, Urethroscopic picture of posterior urethra showing papillary tumors in region of the verumontanum. *B*, Diagrammatic sketch showing relative position of these tumors.

anesthesia a No. 32 French sound was forced through the posterior urethra by Dr. David, who states that there was a very definite resistance just proximal to the cut-off muscle. A No. 24 French indwelling catheter was inserted and the suprapubic wound closed permanently in four days. The patient was then referred to my service.

After suprapubic closure the indwelling catheter was removed and a No. 24 French cysto-urethroscope was passed, with considerable posterior urethral resistance. The bladder mucosa lacked its normal luster and presented a ridge of edema

at the site of the incision, and similar lesions completely encircled the true vesical neck. The vesical neck was not regular, but dilated easily and contracted normally. The posterior urethra was essentially normal from the true sphincter distally to the verumontanum. Attached to the distal aspect of this structure was an elongated papillary tumor with a distinct pedicle (Fig. 396, *A*). Other similar but smaller growths were seen attached to the floor and lateral walls of the urethra immediately adjacent.

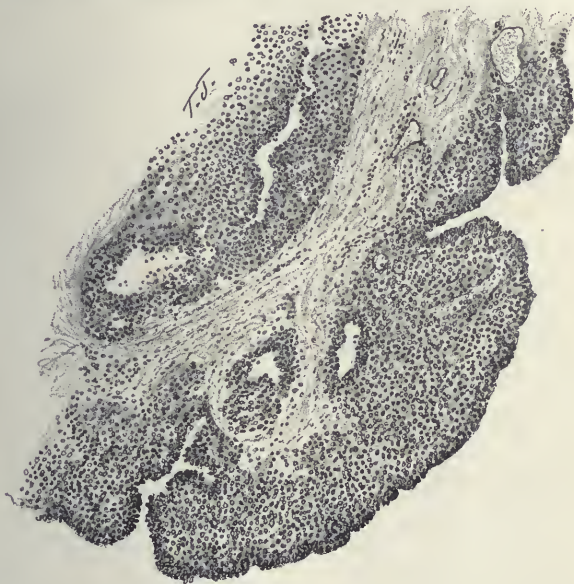


Fig. 397.—Low-power microscopic view of tumor (2) in Fig. 396, *A*.

Through an operating urethroscope and snare a portion of tissue was removed for diagnosis. The microscopic sections of this tissue presented the appearance of a typical benign papilloma (Fig. 397).

The snare was eventually used to remove the bulk of the tumor tissue, while the bases and smaller tumors were removed by fulguration. After the removal of the largest tumor, which was done at the first sitting, it was not necessary to replace the indwelling catheter, as urine was passed per urethrum without obstruction immediately after.

Following the intra-urethral procedure a left epididymitis developed; otherwise there were no untoward results. The patient returned to work six weeks after the removal of the largest papilloma, having normal urination in spite of persistent pyuria. There is no nocturia at present. There has been no recurrence following the last fulguration two months ago.

Epithelial tumors of the posterior urethra are not uncommon, a fact which is being more and more recognized as means for their identification become less difficult. Undoubtedly many instances of these neoplasms are never recognized, as they are not considered in the diagnosis and, therefore, no attempt is made to discover them. However, tumors of a size sufficient to produce acute urinary retention are exceedingly rare, and for this reason this case is brought to your attention.

BENIGN EPITHELIAL TUMORS OF THE URETER

Summary: Recurrence of symptoms one week after nephrectomy performed for repeated attacks of pain and hematuria. Ureterectomy reveals benign papillary growths.

THE patient is a woman thirty-five years old, who enters the hospital complaining of bloody urine and severe pain in the left side.

Her medical history previous to the onset of the present symptoms has no direct bearing on the present condition. The trouble was first recognized by the patient about two years ago, when she very suddenly developed severe pain in the left side and back corresponding to the position of the left kidney. There was distinct tenderness over the kidney at this time. Immediately following the attack of pain the urine appeared bloody. She was given some sort of internal medication for several weeks without demonstrable effect, as she continued to bleed almost constantly, and had periods when it became more profuse, and was then associated with pain in the left side and back.

Cystoscopy was done in August, 1919, at which time it was determined that the bleeding was entirely from the left ureteral orifice. Examination of segregated urines gave no evidence of tubercular or pyogenic infection and roentgenograms were negative for stone. In February, 1920, after a very severe attack, a blood-cast about the size of the ureteral lumen was passed.

With a gradual increase in frequency and severity of the attacks of pain and also an increase in the amount of blood passed, her physician deemed it advisable to do a left nephrectomy, which he did in May, 1920. The pathologic report from a reliable source states that the kidney specimen showed a very mild chronic diffuse nephritis, there being no evidence of tumor, stone, or infection.

There were none of the usual symptoms for a week following operation, then bleeding recurred, associated with the most

severe attack of pain yet experienced. The character of the pain was more colicky than formerly and extended downward in front along the course of the left ureter. The attacks have continued since with such marked severity that frequent hypodermics of morphin were required to give relief. The patient has been referred to my service for further urologic examination.

The patient is now, three weeks after nephrectomy, bleeding rather profusely and complaining of colicky pain along the course of the left ureter. General examination is negative. The urine shows macroscopic blood, but is otherwise negative. The hemoglobin estimation of the blood is 75 per cent., with the cellular content not appreciably disturbed.

Cystoscopy reveals a distinct blood-clot protruding from the left ureteral orifice. Except for the blood-stained vesical mucosa about this ureteral orifice the bladder is normal. The region about the orifice is carefully washed, the clot removed, and close observation made for the presence of tumor, but none is seen. A No. 6 skiagraphic catheter is passed 23 cm. up the left ureter before obstruction is met. Drops of bright red blood drop from the end of the catheter. A silver iodid ureterogram is made and the ureter is seen to extend 4 to 5 cm. beyond the point of obstruction. There is no dilatation or tortuosity of the ureter, neither are there any extra- or intra-ureteral shadows.

A diagnosis of ureteral neoplasm is made and complete ureterectomy advised.

The patient is now prepared for operation. By extending the previous nephrectomy incision downward and forward and drawing the peritoneum forward the ureter is exposed down to within 2 to 3 cm. from the bladder. A large-sized ureteral catheter remains in the ureter to facilitate identification. The catheter is now removed, the ureter ligated, and cut about 1 inch from its entrance into the bladder. The muscles are closed in layers and the fascia and skin closed separately without drainage.

At the time of nephrectomy, it has been learned, about 5 cm. of the ureter were removed. Upon opening the ureter it is noticed that the mucosa of the entire structure is blood-stained



Fig. 398.—Cut section of ureter showing papillary tumors (indicated by arrows).

and about 5 cm. from the upper end there is a distinct papillary growth (Fig. 398) which has one long villus and many rather

indistinct shorter ones. The pedicle is attached to mucosa, normal in appearance and consistency. A second very small growth is similarly placed 2 cm. above this one and a third 1 cm. below the largest growth. From its gross appearance the tumor is apparently a benign papilloma.

Primary benign neoplasms of the ureter are very rare, there being but 13 cases of benign epithelial new growths of the ureter reported in the literature to date. Malignant epithelial tumors are more frequent, but are still very uncommon lesions. Indeed, the ureters are many times involved in secondary growths both from the renal pelvis and bladder.

While there is no definite etiology of these neoplasms, it has been observed that they are quite frequently associated with impacted ureteral calculus. Instances are presented to demonstrate the potentially malignant character of these apparently benign structures, as is the case in all urinary papillomas.

The most common symptoms are hematuria, pain, and tumor. The pain is due to hydronephrosis or hematonephrosis caused by the obstruction of the ureter or to real ureteral colic caused by the presence of blood-clots in the ureter. The patient this morning had had both types of pain. Her first pains were undoubtedly due to intrapelvic pressure, while the postnephrectomy pains were typical of ureteral foreign substance. Hematuria has been present in every instance examined and recognized during life. A few postmortem specimens are described where there was no history of hematuria.

Tumor mass is present in over half of the cases and is sometimes the first sign or symptom. The mass in all instances is caused by hydro- or hematonephrosis and not by the actual neoplasm. There was no apparent dilatation of the renal pelvis in our case, nor was there a palpable tumor mass at any time.

The treatment is obviously complete removal of the tumor-bearing tissue, which amounts to complete nephrectomy and ureterectomy. No instance of resection is on record. The possibility of recurrence or failure to remove all the neoplastic tissue would be too great to attempt such a procedure.

After-history.—Healing was prompt and the clinical effect

striking. Bleeding and pain stopped at once and the patient left the hospital in two weeks. Six weeks have elapsed since the ureterectomy and there has been no return of symptoms.

Microscopic examination showed a typical benign papilloma, such as is seen so frequently in other structures along the urinary tract. The ureteral musculature was considerably thickened throughout its course; otherwise there were no further changes noted.

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